SAMSUNG

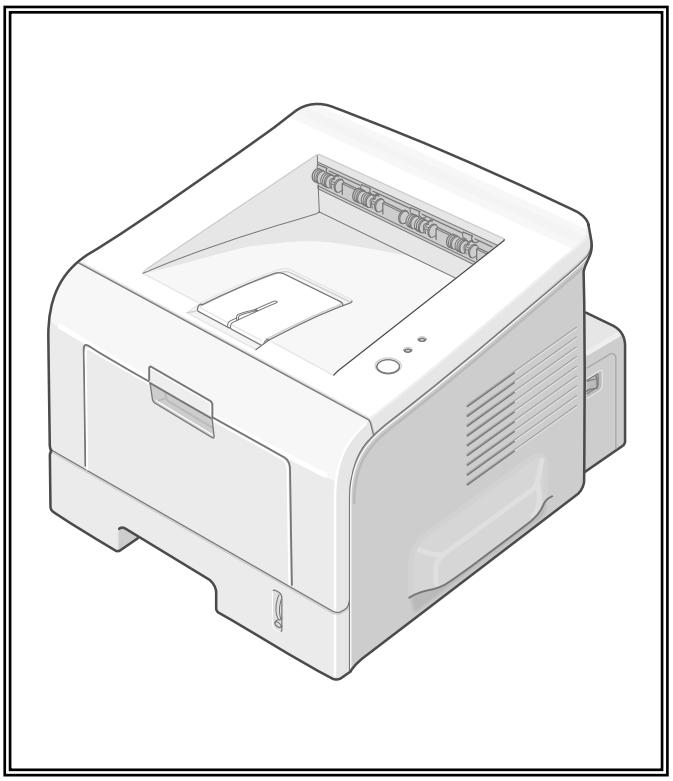
LASER PRINTER
ML-2250 Series

ML-2250/XBG, ML-2251N/XBG, ML-2252W/XBG, ML-2251NP/XBG

Basic Model : ML-2210/ML-2251N

SERVICE *Manual*

LASER PRINTER



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ELECTRONICS

This service manual is also provided on the web, the ITSELF system f Samsung Electronics Co., Ltd.

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VERSION NO. : 1.01 **CODE : JC-0123P**

1. Precautions

In order to prevent accidents and to prevent damage to the equipment please read the precautions listed below carefully before servicing the printer and follow them closely.

1.1 Safety Warning

(1) Only to be serviced by appropriately qualified service engineers.
High voltages and lasers inside this product are dangerous. This printer should only be serviced by a suitably trained and qualified service engineer.

(2) Use only Samsung replacement parts
There are no user serviceable parts inside the printer. Do not make any unauthorized changes or additions to the printer, these could cause the printer to malfunction and create electric shock or fire haz-ards.

(3) Laser Safety Statement
The Printer is certified in the U.S. to conform to the requirements of DHHS 21 CFR, chapter 1 Subchapter J for Class 1(1) laser products, and elsewhere, it is certified as a Class I laser product con-forming to the requirements of IEC 825. Class I laser products are not considered to be hazardous. The laser system and printer are designed so there is never any human access to laser radiation above a Class I level during normal operation, user maintenance, or prescribed service condition.

Warning >> Never operate or service the printer with the protective cover removed from Laser/Scanner assembly. The reflected beam, although invisible, can damage your eyes. When using this product, these basic safety pre-cautions should always be followed to reduce risk of fire, electric shock, and injury to persons.

CAUTION - INVISIBLE LASER RADIATION WHEN THIS COVER OPEN. DO NOT OPEN THIS COVER.

VORSICHT - UNSICHTBARE LASERSTRAHLUNG, WENN ABDECKUNG GE FFNET. NICHT DEM STRAHL AUSSETZEN.

ATTENTION - RAYONNEMENT LASER INVISIBLE EN CAS D OUVERTURE. EXPOSITION DANGEREUSE AU FAISCEAU.

ATTENZIONE - RADIAZIONE LASER INVISIBILE IN CASO DI APERTURA. EVITARE L ESPOSIZIONE AL FASCIO.

PRECAUCION - RADIACION LASER IVISIBLE CUANDO SE ABRE. EVITAR EXPONERSE AL RAYO.

ADVARSEL. - USYNLIG LASERSTR LNING VED BNING, N R SIKKERHEDSBRYDERE ER UDE AF FUNKTION. UNDG UDSAETTELSE FOR STR LNING.

ADVARSEL. - USYNLIG LASERSTR LNING N R DEKSEL PNES. STIRR IKKE INN I STR LEN. UNNG EKSPONERING FOR STR LEN.

VARNING - OSYNLIG LASERSTR LNING N R DENNA DEL R PPNAD OCH SP RREN R URKOPPLAD. BETRAKTA EJ STR LEN. STR LEN R FARLIG.

VARO! - AVATTAESSA JA SUOJALUKITUS OHITETTAESSA OLET ALTTIINA N KYM TT M LLE LASER- S TEILYLLE L KATSO S TEESEEN.

注 意 - 严禁渴开此盖, 以免激光泄露灼伤

주 의 - 이 덮개를 열면 레이저광에 노출될 수 있으므로 주의하십시오.

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1.2 Caution for safety

1.2.1 Toxic material

This product contains toxic materials that could cause illness if ingested.

(1) If the LCD control panel is damaged it is possible for the liquid inside to leak. This liquid is toxic. Contact with the skin should be avoided, wash any splashes from eyes or skin immediately and contact your doctor. If the liquid gets into the mouth or is swallowed see a doctor immediately.

(2) Please keep toner cartridges away from children. The toner powder contained in the toner cartridge may be harmful and if swallowed you should contact a doctor.

1.2.2 Electric Shock and Fire Safety Precautions

Failure to follow the following instructions could cause electric shock or potentially cause a fire.

(1) Use only the correct voltage, failure to do so could damage the printer and potentially cause a fire or electric shock.

(2) Use only the power cable supplied with the printer. Use of an incorrectly specified cable could cause the cable to overheat and potentially cause a fire.

(3) Do not overload the power socket, this could lead to overheating of the cables inside the wall and could lead to a fire.

(4) Do not allow water or other liquids to spill into the printer, this can cause electric shock. Do not allow paper clips, pins or other foreign objects to fall into the printer these could cause a short circuit leading to an electric shock or fire hazard..

(5) Never touch the plugs on either end of the power cable with wet hands, this can cause electric shock. When servicing the printer remove the power plug from the wall socket.

(6) Use caution when inserting or removing the power connector. The power connector must be inserted completely otherwise a poor contact could cause overheating possibly leading to a fire. When removing the power connector grip it firmly and pull.

(7) Take care of the power cable. Do not allow it to become twisted, bent sharply round corners or other wise damaged. Do not place objects on top of the power cable. If the power cable is damaged it could overheat and cause a fire or exposed cables could cause an electric shock. Replace a damaged power cable immediately, do not reuse or repair the damaged cable. Some chemicals can attack the coating on the power cable, weakening the cover or exposing cables causing fire and shock risks.

(8) Ensure that the power sockets and plugs are not cracked or broken in any way. Any such defects should be repaired immediately. Take care not to cut or damage the power cable or plugs when moving the machine.

(9) Use caution during thunder or lightening storms. Samsung recommend that this machine be disconnected from the power source when such weather conditions are expected. Do not touch the machine or the power cord if it is still connected to the wall socket in these weather conditions.

(10) Avoid damp or dusty areas, install the printer in a clean well ventilated location. Do not position the machine near a humidifier. Damp and dust build up inside the machine can lead to overheating and cause a fire.

(11) Do not position the printer in direct sunlight. This will cause the temperature inside the printer to rise possibly leading to the printer failing to work properly and in extreme conditions could lead to a fire.

(12) Do not insert any metal objects into the machine through the ventilator fan or other part of the casing, it could make contact with a high voltage conductor inside the machine and cause an electric shock.

1.2.3 Handling Precautions

The following instructions are for your own personal safety, to avoid injury and so as not to damage the printer

(1) Ensure the printer is installed on a level surface, capable of supporting its weight. Failure to do so could cause the printer to tip or fall.

(2) The printer contains many rollers, gears and fans. Take great care to ensure that you do not catch your fingers, hair or clothing in any of these rotating devices.

(3) Do not place any small metal objects, containers of water, chemicals or other liquids close to the printer which if spilled could get into the machine and cause damage or a shock or fire hazard.

(4) Do not install the machine in areas with high dust or moisture levels, beside on open window or close to a humidifier or heater. Damage could be caused to the printer in such areas.

(5) Do not place candles, burning cigarettes, etc on the printer, These could cause a fire.

1.2.4 Assembly / Disassembly Precautions

Replace parts carefully, always use Samsung parts. Take care to note the exact location of parts and also cable routing before dismantling any part of the machine. Ensure all parts and cables are replaced correctly. Please carry out the following procedures before dismantling the printer or replacing any parts.

(1) Check the contents of the machine memory and make a note of any user settings. These will be erased if the mainboard or network card is replaced.

(2) Ensure that power is disconnected before servicing or replacing any electrical parts.

(3) Disconnect printer interface cables and power cables.

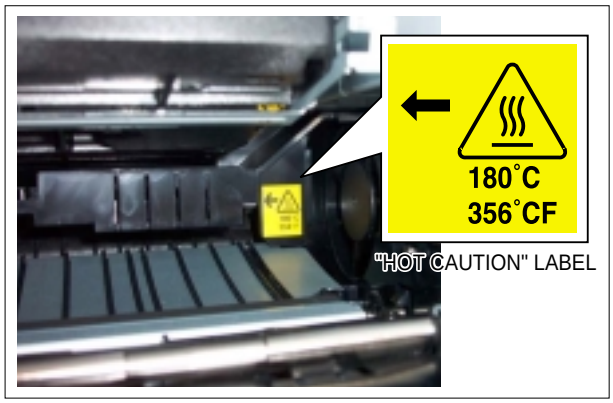
(4) Only use approved spare parts. Ensure that part number, product name, any voltage, current or temperature rating are correct.

(5) When removing or re-fitting any parts do not use excessive force, especially when fitting screws into plastic.

(6) Take care not to drop any small parts into the machine.

(7) Handling of the OPC Drum

- The OPC Drum can be irreparably damaged if it exposed to light.
  Take care not to expose the OPC Drum either to direct sunlight or to fluorescent or incandescent room lighting. Exposure for as little as 5 mins can damage the surface's photoconductive properties and will result in print quality degradation. Take extra care when servicing the printer. Remove the OPC Drum and store it in a black bag or other lightproof container. Take care when working with the covers(especially the top cover) open as light is admitted to the OPC area and can damage the OPC Drum.
- Take care not to scratch the green surface of OPC Drum Unit.
  If the green surface of the Drum Cartridge is scratched or touched the print quality will be compromised.



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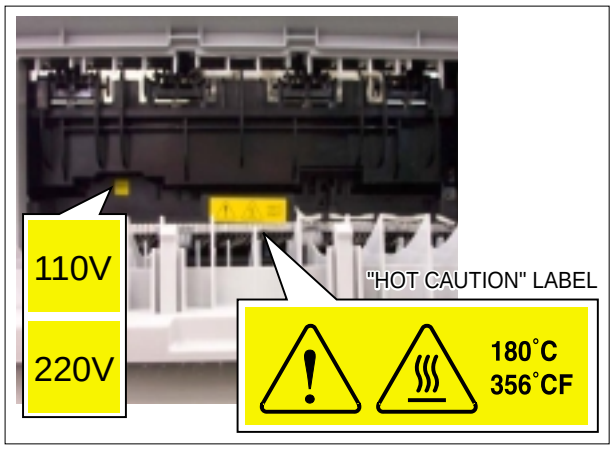


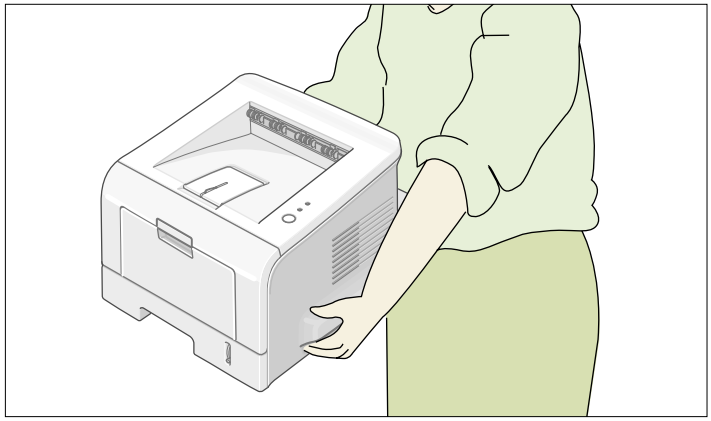
<ELA HOU-FUSER LV>

1.2.5 Disregarding this warning may cause bodily injury

(1) Be careful with the high temperature part.
The fuser unit works at a high temperature. Use caution when working on the printer. Wait for the fuser to cool down before disassembly.

(2) Do not put finger or hair into the rotating parts.
When operating a printer, do not put hand or hair into the rotating parts (Paper feeding entrance, motor, fan, etc.). If do, you can get harm.

(3) When you move the printer.
This printer weighs 12.7kg including toner cartridge and cassette. Use safe lifting and handling techniques. Use the lifting handles located on each side of the machine. Back injury could be caused if you do not lift carefully.



(4) Ensure the printer is installed safely.
The printer weighs 12.7Kg, ensure the printer is installed on a level surface, capable of supporting its weight. Failure to do so could cause the printer to tip or fall possibly causing personal injury or damaging the printer.

(5) Do not install the printer on a sloping or unstable surface. After installation, double check that the printer is stable.

1.3 ESD Precautions

Certain semiconductor devices can be easily damaged by static electricity. Such components are commonly called “Electrostatically Sensitive (ES) Devices”, or ESDs. Examples of typical ESDs are: integrated circuits, some field effect transistors, and semiconductor “chip” components.

The techniques outlined below should be followed to help reduce the incidence of component damage caused by static electricity.

Caution >>Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

1. Immediately before handling a semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, employ a commercially available wrist strap device, which should be removed for your personal safety reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ESDs, place the assembly on a conductive surface, such as aluminum or copper foil, or conductive foam, to prevent electrostatic charge buildup in the vicinity of the assembly.
3. Use only a grounded tip soldering iron to solder or desolder ESDs.
4. Use only an “anti-static” solder removal device. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ESDs.
5. Do not use Freon-propelled chemicals. When sprayed, these can generate electrical charges sufficient to damage ESDs.
6. Do not remove a replacement ESD from its protective packaging until immediately before installing it. Most replacement ESDs are packaged with all leads shorted together by conductive foam, aluminum foil, or a comparable conductive material.
7. Immediately before removing the protective shorting material from the leads of a replacement ESD, touch the protective material to the chassis or circuit assembly into which the device will be installed.
8. Maintain continuous electrical contact between the ESD and the assembly into which it will be installed, until completely plugged or soldered into the circuit.
9. Minimize bodily motions when handling unpackaged replacement ESDs. Normal motions, such as the brushing together of clothing fabric and lifting one’s foot from a carpeted floor, can generate static electricity sufficient to damage an ESD.

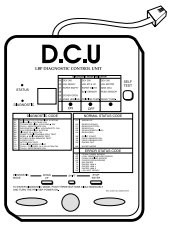
2. Reference Information

This chapter contains the tools list, list of abbreviations used in this manual, and a guide to the location space required when installing the printer. A definition of tests pages and Wireless Network information definition is also included.

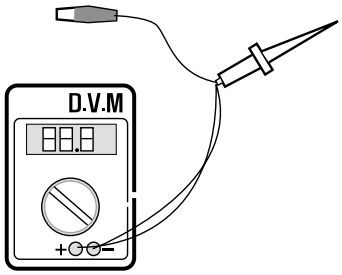
2.1 Tool for Troubleshooting

The following tools are recommended safe and easy troubleshooting as described in this service manual.

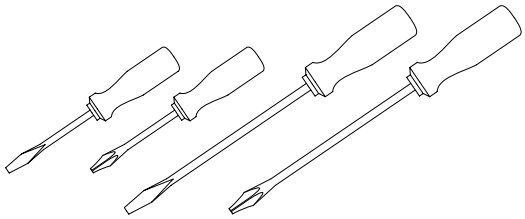
- **DCU(Diagnostic Control Unit)**
  Standard : Test equipment to diagnose the Laser printer supplied by Samsung Electronics.



- **DVM(Digital Volt Meter)**
  Standard : Indicates more than 3 digits.



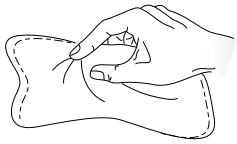
- **Driver**
  Standard : "-" type, "+" type (M3 long, M3 short, M2 long, M2 short).



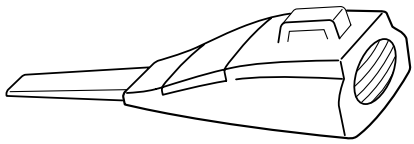
- **Tweezers**
  Standard : For general home use, small type.

- **Cotton Swab**
  Standard : For general home use, for medical service.

- **Cleaning Equipments**
  Standard : An IPA(Isopropyl Alcohol)dry wipe tissue or a gentle neutral detergent and lint-free cloth.

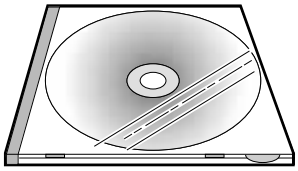


- **Vacuum Cleaner**



- **Spring Hook**
  Standard : For general use

- **Software (Driver) installation CD ROM**



2.2 Acronyms and Abbreviations

The table below explains the abbreviations and acronyms used in this service manual. Where abbreviations or acronyms are used in the text please refer to this table.

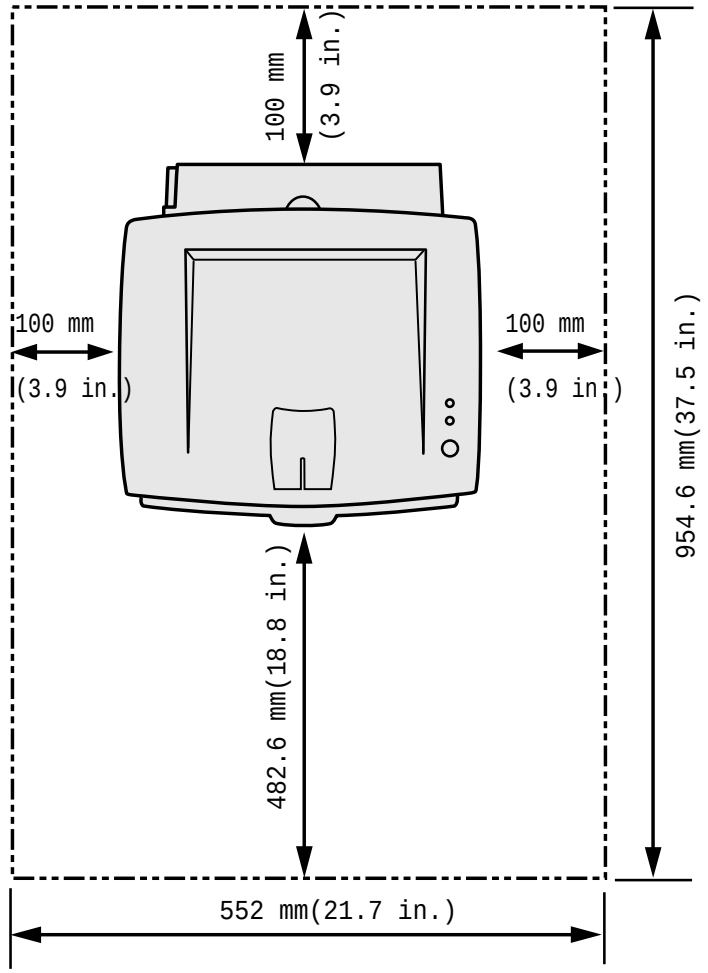
ADC	Analog-to-Digital-Conversion
AP	Access Point
AC	Alternating Current
ASIC Circuit	Application Specific Integrated
ASSY	Assembly
BIOS	Basic Input Output System
BLDC Motor	Brushless DC Motor
CMOS	Complementary Metal Oxide Semiconductor
CMYK	Cyan, Magenta, Yellow, Black
CN	Connector
CON	Connector
CPU	Central Processing Unit
CTD Sensor	Color Toner Density Sensor
dB	Decibel
dBA	A-Weighted decibel
dBm	Decibel milliwatt
DC	Direct Current
DCU	Diagnostic Control Unit
DIMM	Dual In-line Memory Module
DPI	Dot Per Inch
DRAM	Dynamic Random Access Memory
DVM	Digital Voltmeter
ECP	Enhanced Capability Port
ECU	Engine Control Unit
EEPROM	Electronically Erasable Programmable Read Only Memory
EMI	Electro Magnetic Interference
EP	Electro photographic
EPP	Enhanced Parallel Port
F/W	Firmware
FCF/FCT	First Cassette Feeder/First Cassette Tray
FISO	Front-In, Side-Out
FPOT	First Print out Time
GDI	Windows Graphic Device Interface
GIF	Graphic Interchange Format
GND	Ground
HBP	Host Based Printing
HDD	Hard Disk Drive
HTML	Hyper Text Transfer Protocol
HV	High Voltage
HVPS	High Voltage Power Supply
I/F	Interface
I/O	Input and Output
lb	Pound(s)
IC	Integrated Circuit
ICC	International Color Consortium
IDE	Intelligent Drive Electronics or Integrated Drive Electronics
IEEE	Institute of Electrical and Electronics Engineers. Inc
IOT	Image Output Terminal (Color printer, Copier)
IPA	Isopropy Alcohol
IPC	Inter Process CommunicationEPP Enhanced parallel Port
IPM	Images Per Minute
ITB	Image Transfer Belt
LAN	local area network

LBP	Laser Beam Printer
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LSU	Laser Scanning Unit
MB	Megabyte
MHz	Megahertz
MPBF	Mean Prints Between Failure
MPF/MPT	Multi Purpose Feeder/Multi Purpose Tray
NIC	Network Interface Card
NPC	Network Printer Card
NVRAM	Nonvolatile Random Access Memory
OPC	Organic Photo Conductor
PBA	Printed Board Assembly
PCL	Printer Command Language , Printer Control Language
PCI	Peripheral Component Interconnect by Intel 1992/6/22, is a local bus standard developed by Intel and introduced in April, 1993 : A60, B60 Pins
PDF	Portable Document Format
PDL	Page Description Language
Ping	Packet internet or Inter-Network Groper
PPD	Postscript Printer Discription
PPM	Page Per Minute
PS	Post Script
PTL	Pre-Transfer Lamp
PWM	Pulse Width Moduration
Q'ty	Quantity
RAM	Random Access Memory
ROM	Read Only Memory
SCF/SCT	Second Cassette Feeder/Second Cassette Tray
SMPS	Switching Mode Power Supply
SPGP	Samsung Printer Graphic Processor
SPL	Samsung Printer Language
Spool	Simultaneous Peripheral Operation Online
SURF	Surface Rapid Fusing
SW	Switch
sync	Synchronous or Synchronization
T1	ITB
T2	Transfer Roller
TRC	Toner Reproduction Curve
PnP	Universal Plug and Play
URL	Uniform Resource Locator
USB	Universal Serial Bus
VCCI	Voluntary Control Council for Interference Information Technology Equipment
WECA Alliance	Wireless Ethernet Compatibility
Wi-Fi	Wireless Fidelity

2.3 Select a location for the printer

- Leave enough room to open the printer trays, covers, and allow for proper ventilation. (see diagram below)

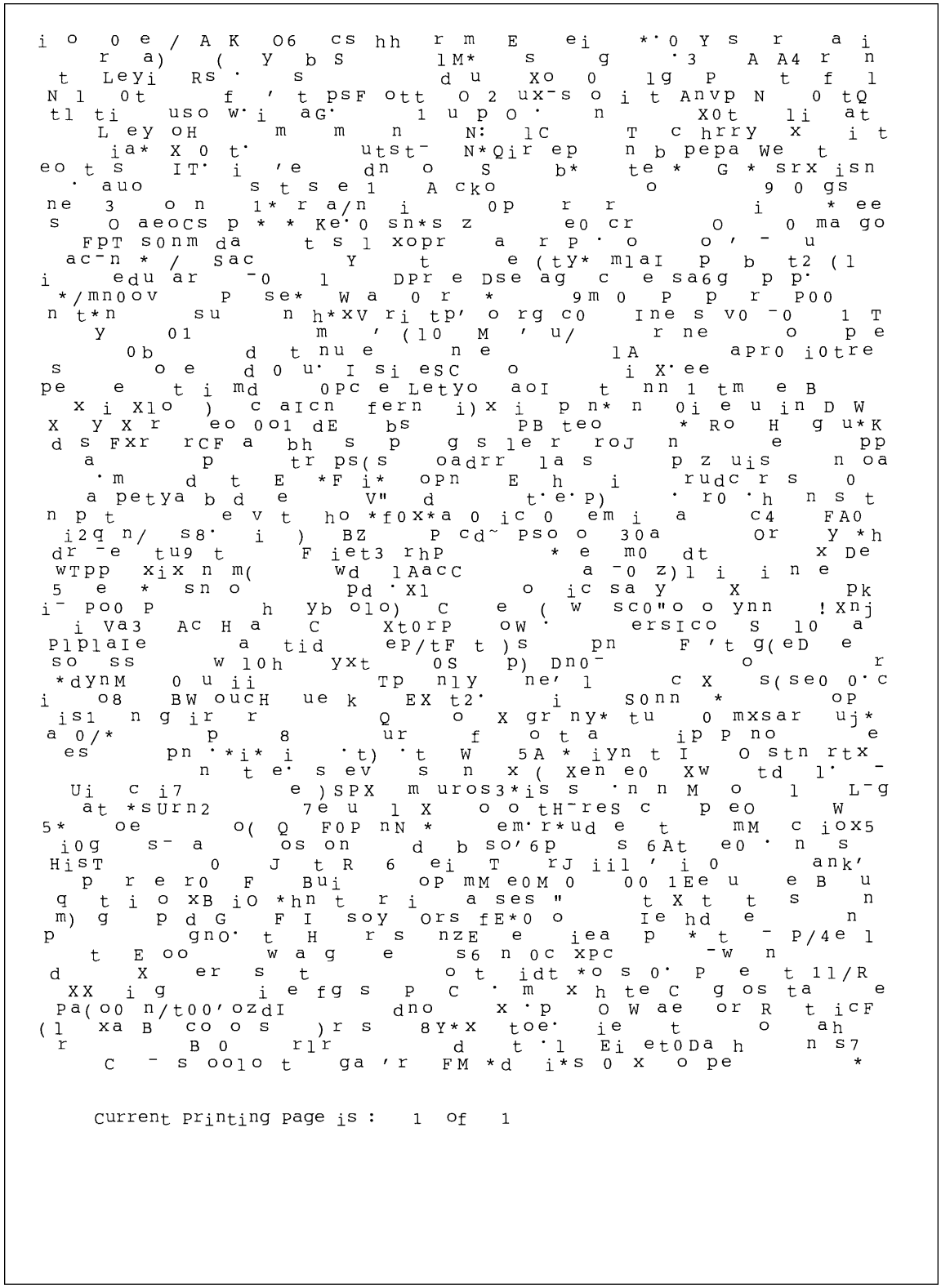
- Provide the proper environment :
  - A firm, level surface
  - Away from the direct airflow of air conditioners, heaters, or ventilators
  - Free of extreme fluctuations of temperature, sunlight, or humidity
  - Clean, dry, and free of dust



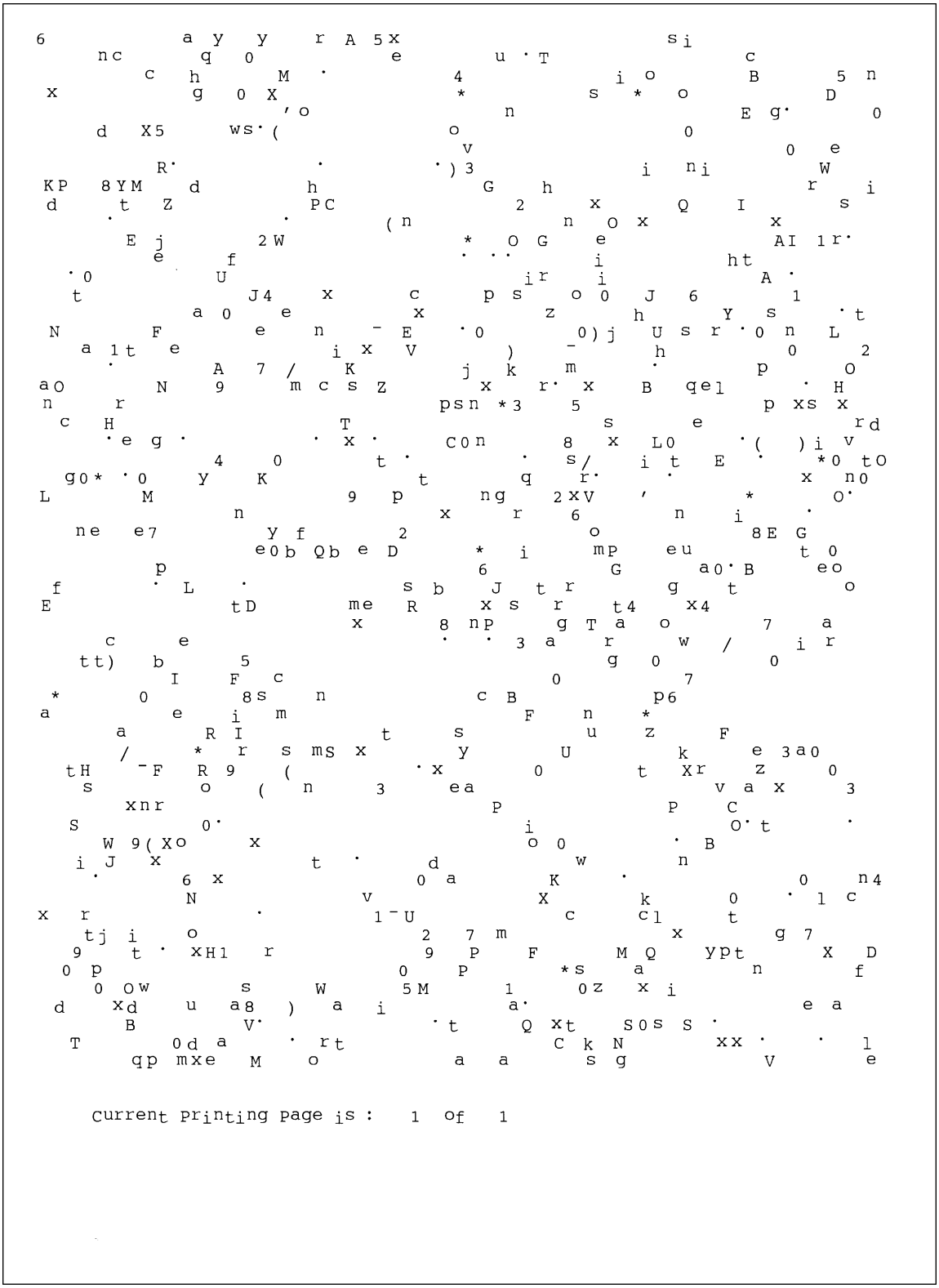
2.4 Sample Tests Patterns

The sample patterns shown below are the standard test patterns used in the factory.
The life of the toner cartridge, developer cartridge and printing speed are measured with the pattern shown below (5%). The 5% and 2% samples are reproduced reduced to 70% of the actual A4 size.

2.4.1 A4 5% Pattern



2.4.2 A4 2% Pattern



2.4.3 A4 ISO 19752 Standard Pattern

This test page is reproduced at 70% of the normal A4 size

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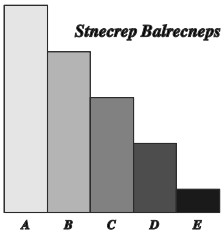

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2.6 Wireless LAN

• This product can be used with a wireless LAN, (this is an option.)
- The wireless LAN function uses radio technology, instead of using LAN cable, to connect to an access point for printing.
- For a wireless LAN connection in Infrastructure mode an AP is needed, (purchased separately)
- For a wireless LAN connection in Ad-Hoc mode an appropriate Wireless I/F card is required fitted to a computer, (purchased separately)
- It is possible to use a wireless LAN connection with wired LAN.
- If an AP is installed in an office or at home, the wireless LAN function can be simply configured and used.

• Types of desk top PC (or Lap top) that uses the wireless LAN.

Division	Basic type	Recommend type
CPU	Over PENTIUM 233M	PENTIUM 300MHz
MEMORY	Over 64MB	Over 128MB
VIDEO CARD	Over 800X600	Over 1024X768
OS	Over WINDOWS 98	Over WINDOWS ME
INTERFACE CARD	A product has a certificated mark of Wi-Fi™	

• About the certificated mark of Wi-Fi™

- Wi-Fi™ is a registered trademark of the WECA (Wireless Ethernet Compatibility Alliance). Over 50 wireless LAN companies are member of this organisation. Most of the main wireless networking companies are attending including such companies as Lucent Technologies, Cisco, Intel/Symbol, 3Com, Enterasys (Cabletron), Compaq, IBM, Nokia, Dell, Philips, Samsung Electronics, Sony, Intersil, etc.. This mark certifies mutual compatibility amongst the product of these companies. Wi-Fi™ (IEEE 802.1) is certified as a standard of the wireless LAN market.

3. Specifications

Product specifications are subject to change without notice.See below for product specifications.

3.1 General Specifications

Item		ML-2250 Series	
		ML-2250	ML-2251N/ML-2252W
*Speed	Simples	Up to 20ppm in A4(22ppm in Letter)	
	Duplex	NO	
Resolution	-	Up to 1200x1200dpi effective output	
	Default	600dpi	
	RET Chip	YES	
	Gray Scale Level	128 Gray	
Size (W*D*H)	Set	358mmx452mmx278mm (14.1"x17.8"x10.9")	
Weight	Set Net (with Image artridge)	10kg (22 lbs)	
	Packing	12.7kg (28lbs)	
Design	Paper Path	Cassette Type, S-Path	
	Multi Purpose Feeder	YES (50 Sheets)	
	Paper Output Tray	YES (Stacker)	
	Duplex	NO	
	Cabinet Color	S. White(W91641), Bright Gray (G71335)	
	Paper Indicator	YES (Lever)	
	LCD	NO	
	Button	1 Key (No LED): Cancel / Toner Save	
	LED	2 LED (1 Dual Color LED): Ready, Error,Toner Save	
Warm-Up Time	Cold Warm-Up	42 sec	
	sleep mode	42 sec	
FPOT	Stand By	10 sec (from LSU 'ON',A4)	
	Sleep Mode	50 sec	
Electric	Input Voltage	Low Voltage : 100~127VAC (active range 90 ~ 135VAC), High Voltage : 200~240VAC (active range 180 ~ 264VAC)	
	Electric Currency	Amp (in 220VAC/110VCA)	
	Input Frequency	50/60 Hz(+/- 3Hz)	
Power Switch		YES	
Power Consumption	Ready	Less than 70w	
	AVG.	Less than 350w	
	Max.	700w	
	Power Save	Less than 11w	
Power Save Mode	Support	YES (RCP Mode)	
	Setting Unit	Default : 5 min , Off/ 5 min/ 10 min/ 15 min/ 30 min/ 45 min/ 60 min	
**Acoustic Noise	Printing	Less than 51 dBA	
	Stand-By	Less than 39 dBA	
Printing	Size (Max.)	216mmx356mm (8.5"x14")	
	Size (Min.)	76mmx127mm (3"x5")	
	Margin(Top/Bottom/ Left/Right)	4mm, 4mm, 4mm, 4mm	

* Print speed will be affected by Operating System used, computing performance, application software, connecting method, media type, media size and job complexity.

** Sound Pressure Level, ISO 7779

Item		ML-2250 Series	
		ML-2250	ML-2251N/ML-2252W
Paper Input	Pick-Up	Center Feeding	
	Capacity	Max 550 sheet 1. Cassette : 250 sheet 2. MPF : 50 Sheet (Special Media 5 Sheets) 3. Optional Second Cassette Feeder :250 sheets	
	Media Type	- Cassette : A4, A5, Letter, Legal, Executive, Folio, ISO B5, JIS B5, 3"x5", Oficio - Manual Slot : No - Multi Purpose Feeder : A4, A5, A6, Letter, Legal, Folio, Executive, ISO B5, JIS B5, 3"x5", Monarch, No.10, DL, C5, C6, ficio - Second Cassette Feeder : A4, A5, Letter, Legal, Executive, Folio, ISO B5, JIS B5, C6, Oficio	
	Media Weight	1. Cassette : 16~24lb (60 to 90g/•) 2. Multi Purpose Feeder : 16~43lb (60 to 163g/•) 3. Second Cassette Feeder : 16~24lb (60 to 90g/•)	
Paper Output	Capacity	Max151 sheet 1. Face-Down :150 sheet , 2. Face-Up : 1 sheet	
	Stacker	1. Face-Down : YES , 2. Face-Up : NO	
	Offset Output	NO	
Sensor	Paper	YES	
	Paper Size	NO	
	Media Type	NO	
	Paper Full	NO	

3.2 Controller Specification

Item		ML-2250 Series	
		ML-2250	ML-2251N/ML-2252W
MPU	CPU	SPGPm 166MHz	
	GEU	YES	
Emulation	Standard	ML-2250: SPL,PCL6(Firmware),EPSON,IBM ProPrinter ML-2250/50G Domestic: SPL, PCL6(Firmware),KS5843,KSSM,KSC5895	
	Option	PostScript 3 with 136 fonts	
	Auto Emulation Sensing	YES	
Interface	Standard	IEEE1284,USB 2.0	
	Option	Serial : NO , IrDA : NO	
	Auto Interface Sensing	YES	
Memory	Standard / Max.	Export : 16MB / 144MB , Domestic : 32MB/160MB	
	Type	SDRAM	
	Expand Memory Slot, Type	YES : 1EA	
	Compression Technology	N/A	
Font	Type	Flash Memory	
	Number	45 Scalable, 1 Bitmap	
Network	Standard	N/A	ML-2251N : 10/100 Base TX , ML-2252W : 10/100 Base TX & Wireless LAN
	Option	YES : 10/100 Base TX YES : 10/100 Base TX & Wireless LAN	ML-2251N : YES (10/100 Base TX & Wireless LAN)
Test Print	Demo Mode	Press the Demo key for 2 seconds	
	Configuration Mode	Press the Demo key for 6 seconds	
	Cleaning Mode	Press the Demo key for 10 seconds	
	Service Mode	Press the Demo key when power on	

3.3 Software Specifications

Item		ML-2250 Series	
		ML-2250	ML-2251N/ML-2252W
OS	Compatibility	- Windows 95/98/NT4.0/2000/Me/XP - Linux OS including Red Hat, Caldera, Debian, Mandrake, Slackware, SuSE, and Turbo Linux	
Printer Driver	Compatibility	SPL	
	Default	SPL	
	Remote Control Panel	YES	
	Status Monitor	USB : YES, Network : YES, Parallel : NO	
	Language	Korea, English, German, France, Spain, Italy, Netherland, Portugal, Russia, Sweden, Norway, Finland, Denmark, China, Taiwan	
	Contents	Printer Driver, Acrobat Reader, Manual, SM, Electronic Registration	
	Electronic Registration	SPL	
Driver Function	Layout	1)Orientation : Portrait, Landscape, Rotate 180 Degrees 2)Layout Options : Type, Pages per Side, Page Order 3)Favorites	
	Paper	1)Copies 2)Paper Options : - Size, - Source, - Type 3)Favorites	
	Graphics	1)Resolution : - 1200dpi (Best), 600dpi (Normal) 2)Toner Save : - Printer Setting,- On,- Off 3)Advanced Options 4)Favorites	
	Extras	1)Watermark 2)Overlay 3)Output Options : - Print Order, - Reprint When Jammed 4)Favorites	
	Printer	1)Printer Configuration : - High Altitude Correction, Power Save => Time Delay	
	About	1) Buy Supplies 2) Samsung Website	
WH	-	XP	

3.4 Consumable Specifications

Item		ML-2250 Series	
		ML-2250	ML-2251N/ML-2252W
Toner Cartridge	Type	Single Cartridge	
	Life (Initial)	5,000 Sheets @ISO 19752 5% Coverage	
	Life (Running)	5,000 Sheets @ISO 19752 5% Coverage	
	Sensor	NO	

3.5 Option Specifications

Item		ML-2250 Series	
		ML-2250	ML-2251N/ML-2252W
Second Cassette	Capacity	250 Sheets (Life : 150,000 Sheets)	
	Media Type	A4, A5, Letter, Legal, Executive, Oficio, Folio, ISO B5, JIS B5	
	Media Weight	16~24lb (60 to 90g/m^2)	
Memory	Upgradable Memory Slot	YES (1EA)	
	Upgradable Memory Type	SDRAM	
	Upgradable Memory Unit	16MB, 32MB, 64MB, 128MB	
	Access Time	70nsec	
Network	Option	YES : Internal Network Adaptor	ML-2251N : 10/100 Base TX & Wireless LAN
	Protocol	SPX/IPX, TCP/IP, Ethertalk, SNMP, HTTP 1.1, DLC/LLC	
	Operating System	MS Windows 98/NT/ME/2000/XP, SUN Solaris, HP-UX, SCO, Novell Netware, Macintosh	
PostScript	Support	PostScript 3 Emulation, 4MB, 8MB	
Duplex	Support	N/A	
Hard Disk	Support	N/A	
	Type	N/A	
Mail Box	Support	N/A	
	Size	N/A	
Serial	Support	N/A	
LocalTalk	Support	N/A	
Emulation	IBM ProPrinter N/A	YES	
	EPSON	YES	

3.6 Other Specifications

Item		ML-2250 Series	
		ML-2250	ML-2251N/ML-2252W
Duty Cycle	Max. Duty Cycle/month	30,000 sheet / month	
MTTR	Mean Time To Repair	30 min	
MPBF	Mean Paper Between Failure	30,000 sheet	
Life Cycle	SET	150,000 sheet or 5 years	
Service	Service Item & Period	1. Transfer Roller : 60K pages 2. Fuser Unit : 80K pages	

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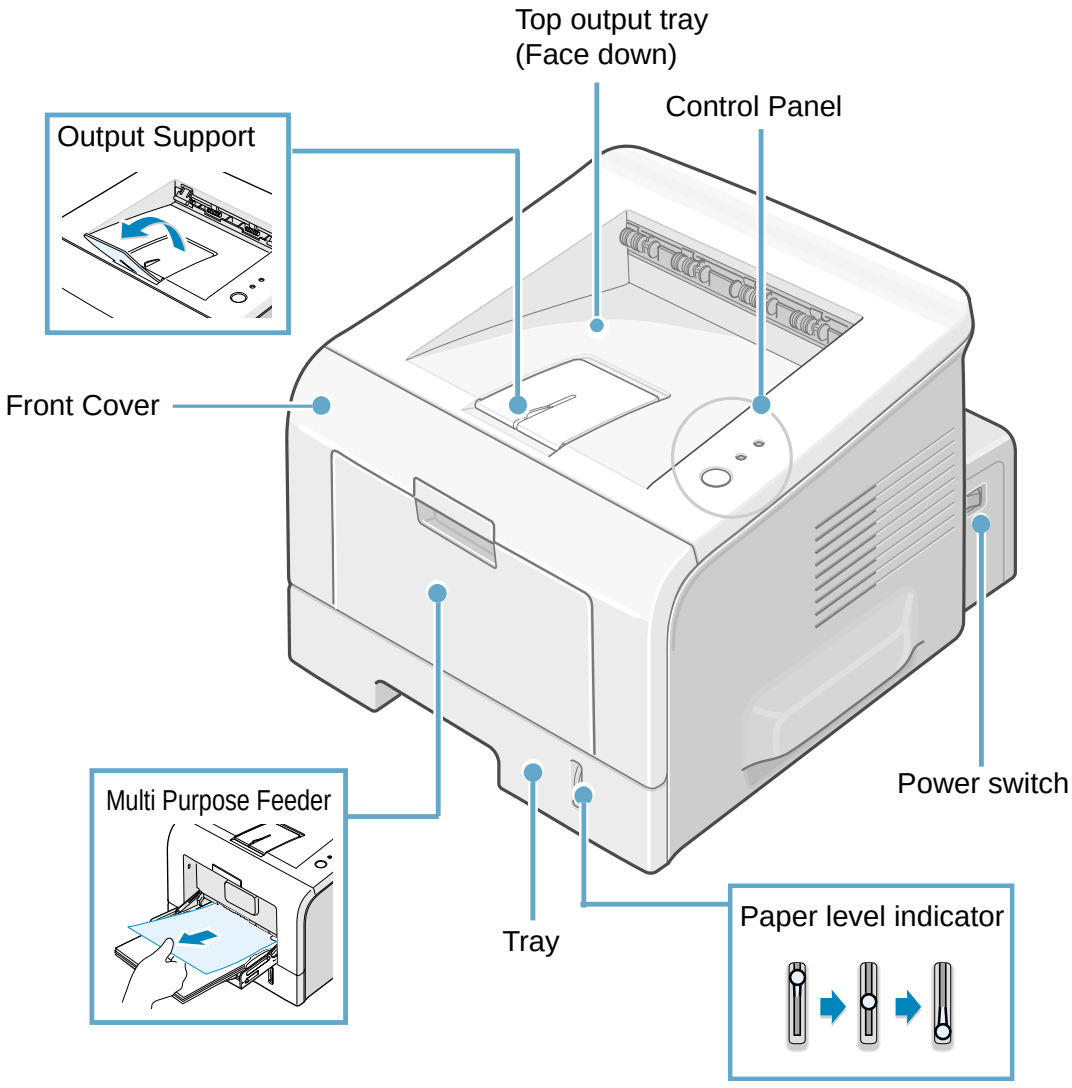
4. Summary of Product

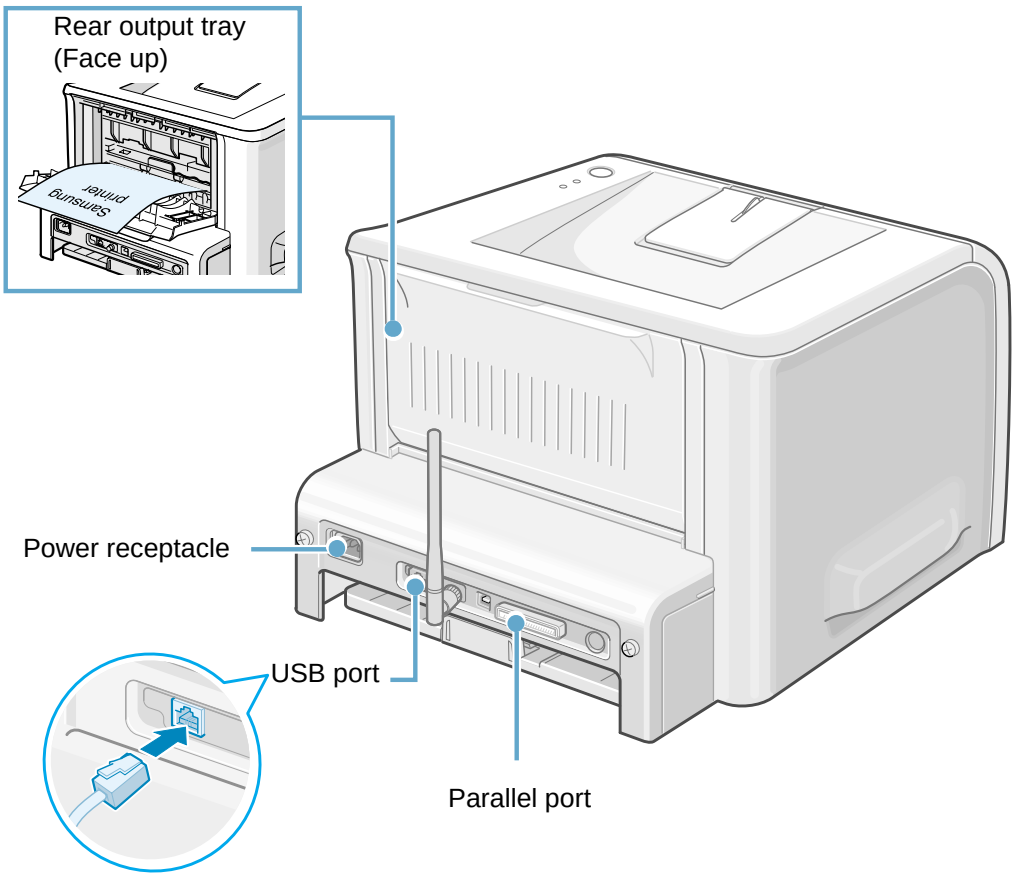
This chapter describes the functions and operating principals of the main components.

4.1 Printer Components

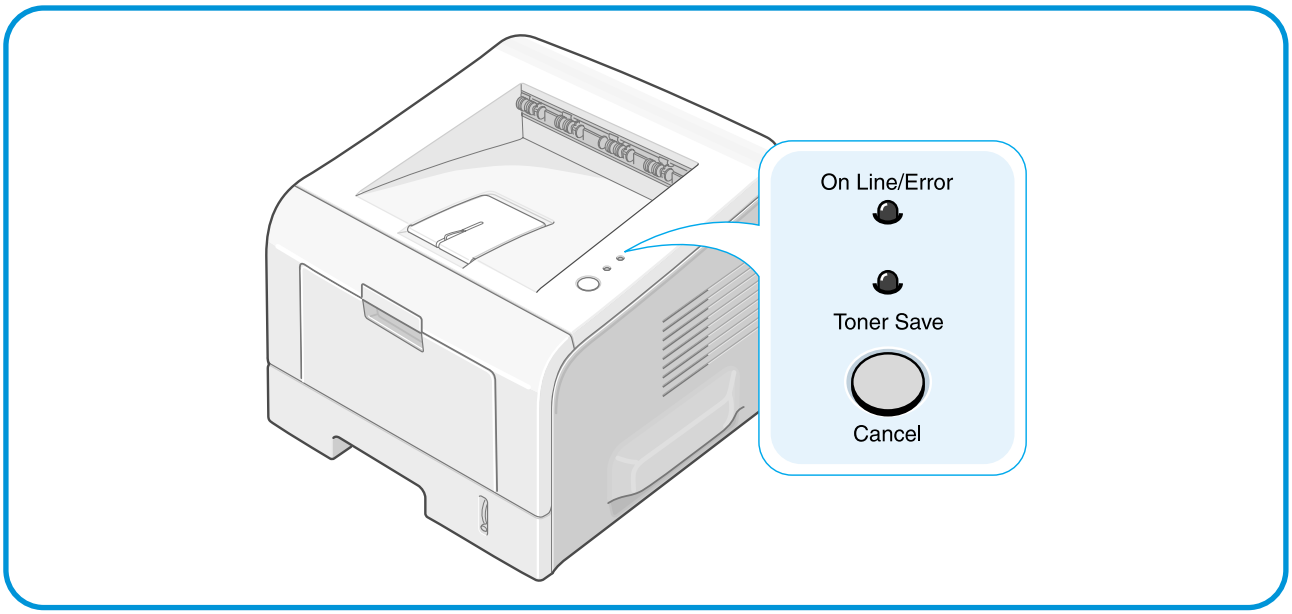
4.1.1 Front View



4.1.2 Rear View



4.1.3 Control Panel



1) On Line/Error and Toner Save LEDs

LED	Description
On Line/Error	If the On Line/Error light is green the printer is ready to print.
	If the On Line/Error light is red the printer is experiencing an error such as jammed paper, cover open or empty toner cartridge.
	If you press the Cancel button while the printer is receiving data the On Line/Error LED blinks red to cancel printing.
	In Manual Feed mode if there is no paper in the Manual Feeder the On Line/Error LED blinks red. Load paper into the Manual Feeder and the LED stops blinking.
	If the printer is receiving data, the On Line/Error LED slowly blinks green. If the printer is printing the received data, the On Line/Error LED blinks green quickly.
Toner Save	If you press the Cancel button in Ready mode this LED is on and the Toner Save mode is enabled. If you press this button once again this LED is off and the Toner Save mode is disabled.
On Line/Error Toner Save	If the On Line/Error and Toner Save LEDs blink at the same time your system has experienced an internal problems. Refer to Section 6.6

2) Cancel button

Printing demo page	In Ready mode press and hold this button for about 2 seconds until all LEDs blink slowly and release.
Printing configuration sheet	In Ready mode press and hold this button for about 6 seconds until all LEDs blink quickly and release.
Cleaning inside printer	In Ready mode press and hold this button for about 10 seconds until all LEDs turn on and release. After cleaning the printer one cleaning sheet is printed.
Canceling print job	Press this button during printing. The On Line/Error LED blinks while the print job is cleared from both the printer and the computer and then return to Ready mode. This may take some time depending on the size of the print job. In Manual Feed mode it is not possible to cancel the print job by pressing this button.
Toner Save mode on/off	In Ready mode, press this button to turn the Toner Save mode on or off.

4.2 System Construction

4.2.1 Summary

The ML2250 consists of the following main functional components

1) The Firmware
This controls the whole printing process

2) The Print Engine consisting of

a) Engine frame

b) Paper feed mechanism
The paper mechanism cosists of a 250sheet main cassette, multi-purpose paper tray, pickup rollers, friction pads and feed rollers. Together with sensors in the feed path these serve to control paper registration and guide the paper through the Image transfer, image development, image fusing and exit assemblies. The paper path has an anti-static connection to earth to eliminate paper feed problems due to static charge on the paper.

c) Main drive mechanism
The main drive is a Bi-polar 2 phase motor. It drives the OPC, Paper Pick-up and paper feed rollers using a gear train mechanism

d) Image development unit
Using a Laser Scanning Unit (LSU) this section of the mechanism creates the image on the OPC drum (part of the integrated toner cartridge).

e) Image transfer unit
The function of the this unit uses High Voltages supplied by the HVPS to move the image from the developer unit onto paper.

f) Image fusing unit
The function of this unit is to permanently fix the toner image onto the paper. This is achieved usibg a temperature controlled heating unit (the fuser).

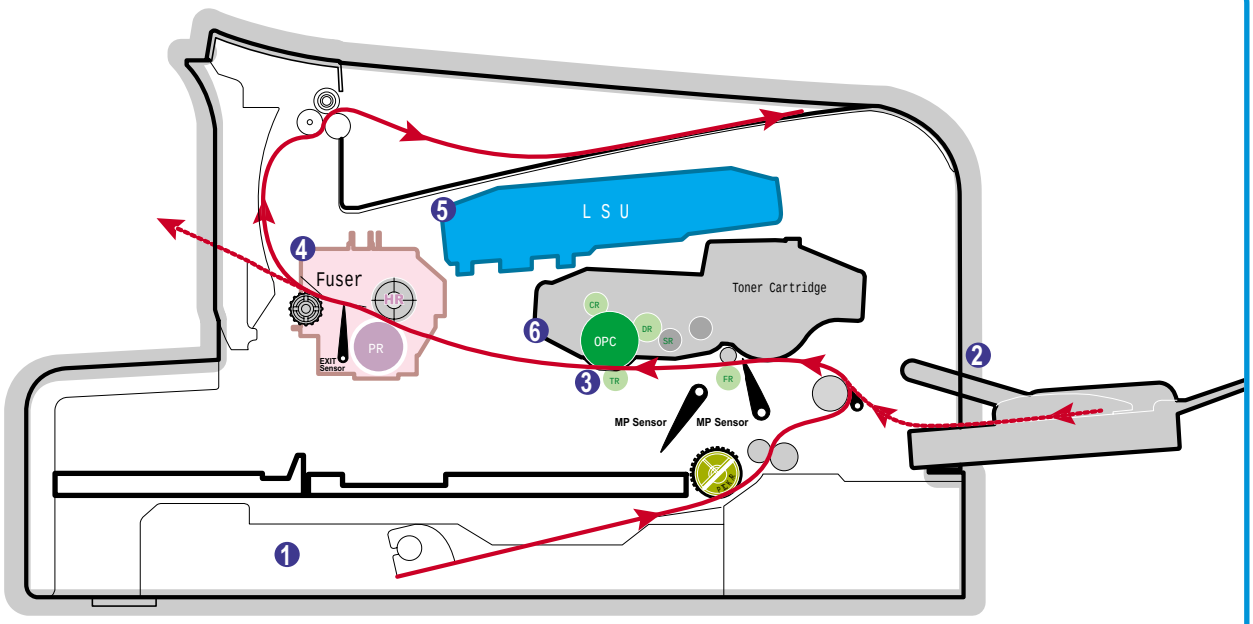
g) Electronics PBA including

i) Main control board consisting of
(1) Main processor Asic (166MHz SPGPm)
(2) Memory parts (Flash Rom containing the control program and DRAM for working memory)
(3) Engine interface parts (motor control, fuser control, HVPS control, sensors etc)
(4) PC Interface (USB , Parallel, Network – wired and wireless)
(5) Bus, DMA and I/O handling

ii) Operators panel

iii) PC Interface

4.2.2 System Layout



1. Cassette
2. Manual Feeder
3. Transfer Roller
4. Fuser
5. LSU(Laser Scan Unit)
6. Toner Cartridge

4.2.3 Paper Feed

This consists of the standard cassette, an optional cassette, an MP tray for supplying different types of media (envelopes, labels, special paper) and other parts related to the movement of paper through the printer.

1) Paper separation method
Individual sheets are separated in the cassette using the 'friction pad' method. When paper feeds into the machine it passes over a spring loaded friction pad that separates the sheets of paper.

2) Paper cassette
The paper cassette uses a 'centre loading' method There are no paper size sensors. Instead a software process is used to detect the size of the first sheet of paper as it is fed through the machine. Both the rear and side paper guides are adjustable to cater for various paper sizes.
There is a 'Paper Empty' sensor which detects the presence of paper (Capacity: 250 sheets).
There is an indicator flag on the front of the cassette which indicates the amount of paper remaining.

3) Pick-up roller
The pickup roller is used to pick-up and feed paper into the printer. It also is used to remove any static charge on the paper.

4) MP tray
The Multi-purpose tray is used to hold non-standard paper sizes and special media (envelopes, transparencies etc.). There is an MP paper empty sensor. It uses a friction pad method to ensure paper separation and can hold a maximum of 50 sheets of paper or envelopes.

5) SCF (Second Cassette Feeder)
The optional second cassette unit is identical to the main cassette and has a capacity of 250 sheets.

4.2.4 Transfer Ass'y

Toner is transferred from the OPC drum onto the paper using a PTL (Pre-transfer Lamp) and a transfer roller. The PTL shines light onto the OPC, this reduces the electrical charge on the surface of the OPC surface and improves the efficiency of the transfer.
The transfer roller transfers toner from the OPC drum to the paper.
Life span: Print over 60,000 sheets (at 15~30ºC)

4.2.5 Driver Ass'y

Power is provided to the paper drive assembly under the control of the main PWA. The main motor powers the paper feed, toner cartridge, fuser unit and all pick-up, feed and exit rollers.

4.2.6 Fuser

There are two methods of fusing toner onto the paper: the existing heat lamp process and the Q-PID process developed by Samsung. ML2250 export models, both 110V and 220V, use the heat lamp process.

This consists of a heat lamp, heat roller, pressure roller, thermistor and thermostat. By use of heat and pressure toner is caused to melt and adhere to the paper surface in order to complete the printing process.

4.2.6.1 Thermistor and Thermostat

The thermistor is used to detect the temperature of the heating unit and feeds this information into the main processor
If the heat lamp becomes too hot the Thermostat cuts off the power to the lamp in order to prevent over-heating and any potential fire hazard is removed.

4.2.6.2 Heat roller

The heat roller transfers the heat from the heat lamp to the paper. The surface of the heat roller is coated with Teflon so that toner does not stick to the surface.

4.2.6.3 Pressure roller

A pressure roller mounted under the heat roller is made of a silicon resin and the surface is also coated with Teflon. When a paper passes between the heat roller and the pressure roller the toner powder is meted and adheres to the surface of the paper permanently.

4.2.6.4 Safety features

To prevent overheating
- 1st protection device: Hardware cuts off when overheated
- 2nd protection device: Software cuts off when overheated
- 3rd protection device: Thermostat cuts off mains power to the lamp.

Safety device
- Fuser power is cut off when the front cover is opened
- LSU power is cut off when the front cover is opened
- The temperature of the fuser cover's surface is maintained at less than 80ºC to protect the user and a caution label is attached where the customer can see it easily when the rear cover is opened.

4.2.7 LSU (Laser Scanner Unit)

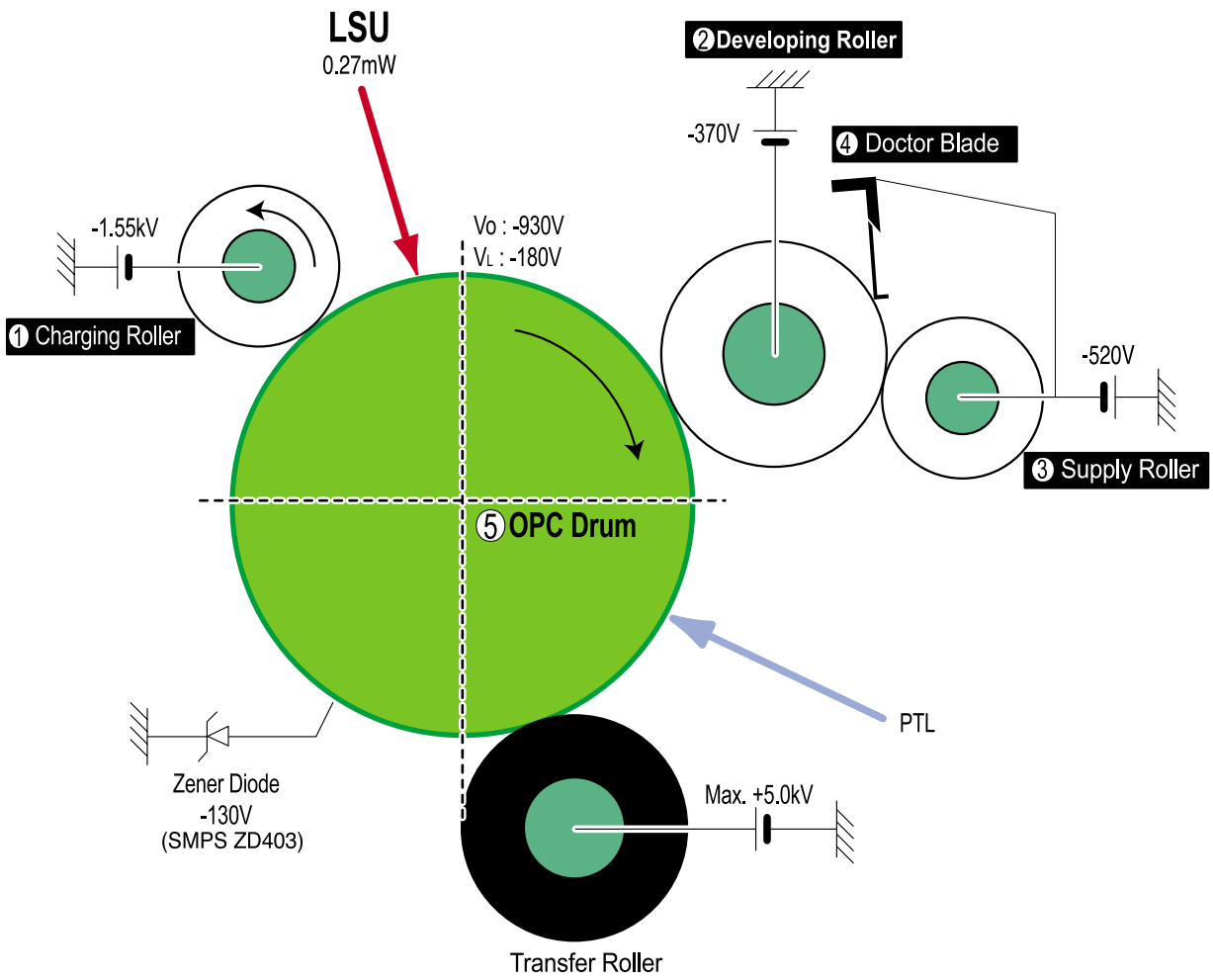
This is the core of the laser printer. It converts the video data received from the computer into an electrostatic latent image on the surface of the OPC drum. This is achieved by controlling the laser beam and exposing the surface of the OPC drum to the laser light. A rotating polygon mirror reflects the laser light onto the OPC and each side of the mirror is one scan line. The OPC drum turns as the paper feeds to scan the image down the page.

The /HSYNC signal is created when the laser beam from LSU reaches the end of the polygon mirror and this signal is sent to the controller. The controller detects the /HSYNC signal to adjust the vertical line of the image on paper. In other words after the /HSYNC signal is detected the image data is sent to the LSU to adjust the left margin on the paper.

4.2.8 Toner Cartridge

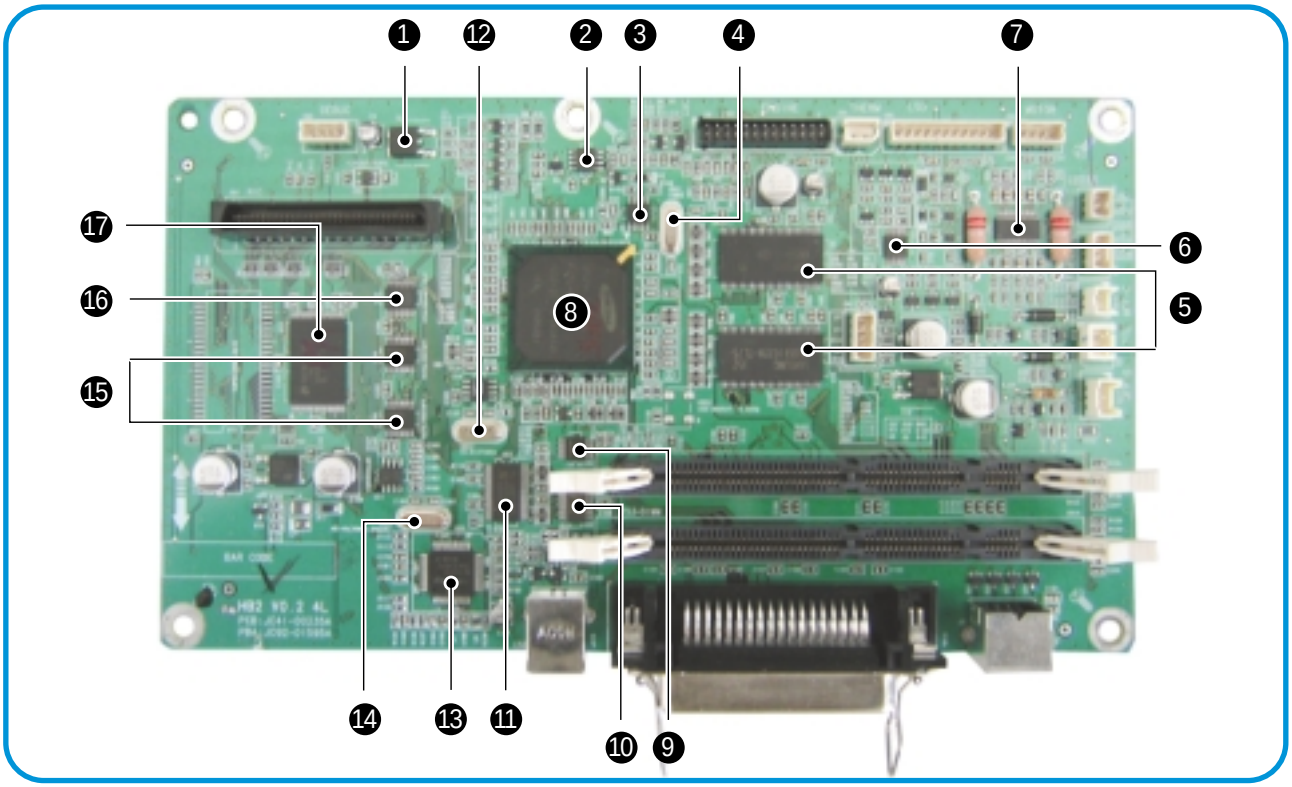
The toner cartridge is an integral unit containing the OPC unit and toner unit. The OPC unit consists of the OPC drum and charging roller, and the toner cartridge unit consists of the toner, supply roller, developing roller, and blade (Doctor blade)

- Developing Method: Non magnetic 1 element contacting method
- Toner: Non magnetic 1 element shatter type toner
- The life span of toner: 5,000 sheets (ISO19752 standard)
- Toner remaining amount detecting sensor: No
- OPC Cleaning: Film OPC using an electro-static cleaning process.
- Management of waste toner: Collected using an electro-static process and retained within the toner cartridge
  --> no waste toner to dispose of.
- OPC Drum protecting Shutter: No.
- Classifying device for toner cartridge: ID is classified by interruption of the frame channel.



4.3 Main PBA(SPL Model)

The Engine Board and Controller Board have been integrated into a single PBA. This consists of the CPU and printer control functions. The CPU functions as the bus controller, I/O handler, motor driver and PC interface. The main board sends the Current Image Video data to the LSU and manages the Electrophotographic printing process. Circuits on the PBA drive include the main motor (paper feed, cartridge, fuser), clutch driver, pre-transfer lamp driver, heat-lamp driver and fan driver.
The signals from the paper feed jam sensor and paper empty sensor are inputted to the main board from the power supply PBA..



1	LOW DROP FIXED AND ADJUSTABLE POSITIVE VOLTAGE REGULATORS(LD1117DT) U1
2	LOW POWER DUAL BIPOLAR COMPARATORS(LM393D) U2
3	SPREAD SPECTRUM CLOCK GENERATOR(CY25811) U4
4	CPU X-TAL(12MHz) OSC1
5	SDRAM(K4S641632H) U6, U15
6	LOW VOLTAGE HEX INVERTER WITH 5V TOLERANT SCHMITT TRIGGER INPUTS(74LCX14) U7
7	MOTOR DRIVER(A3977SLP) U9
8	GRAPHIC PROCESSOR ASIC(SPGPM) U11
9	LOW VOLTAGE HEX INVERTER WITH 5V TOLERANT SCHMITT TRIGGER INPUTS(74LCX14) U24
10	PARALLEL PORT SINGLE TERMINATION NETWORK(ST1284) U23
11	LOW VOLTAGE IEEE 161284 TRANSLATING TRANSCEIVER(161284) U22
12	VIDEO X-TAL(19.6MHz) OSC3
13	USB 2.0(NET2270) U25
14	USB X-TAL(30MHz) OSC4
15	LOW VOLTAGE OCTAL D-TYPE FLIP-FLOP(74LVX273) U14, U19
16	LOW VOLTAGE BIDIRECTIONAL TRANSCEIVER(74LCX245) U10
17	FLASH MEMOTY(29LV160DB) U13

4.3.1 ASIC (SPGPm)

• ARM946ES
  - 32-bit RISC embedded processor core
  - 16KB instruction cache and 16KB data cache
  - No Tightly Coupled Memory
  - Memory Protection Unit &CP15 control program
• Dual bus architecture for bus traffic distribution
  - AMBA High performance Bus (AHB)
  - System Bus with SDRAM
• IEEE1284 compliant parallel port interface
• Printer Video Controller for LBP engines
• Graphic Execution Unit for Banding support of Printer Languages
• Printer Video Controller for LBP engines
  - PVC : Printer Video Controller without RET Algorithm
  - HPVC : Printer Video Controller with RET algorithm
    (Line Memory & Lookup Table Memory : 512 x 8 , 4096 x 16)
• Engine Controller
  - Motor Control Unit
  - Motor Speed Lookup Table Memory (128 x 16 x 2)
  - Pulse Width Modulation Unit
  - 4 Channels are supported
  - ADC Interface Unit
  - 3 ADC Channels are available
  - ADC Core (ADC8MUX8)maximum clock frequency :3 MHz
• USB 2.0 Interface
• Package : 272 pins PBGA
• Power : 1.8V(Core), 3.3V(IO) power operation
• Speed : 166MHz core(ARM946ES)operation,60MHz bus operation

4.3.2 Memory

The ML2250 has Flash ROM and DRAM memory units. There are 2 SODIMM sockets to enable extra DRAm or Flash ROM (Postscript Option) to be fitted.

On Domestic 9Korean) models additional Mask ROM is also fitted: to store domestic Fonts such as PCL Font and KS5895, KSSM etc.
  - Capacity :16MByte
  - Access Time :100nsec

4.3.3 Flash Memory

It stores the system program, this can be updated by downloading the system program through the PC Interface. In export models PCL fonts are also sred in the flash memory.
• Capacity :2M Byte
• Access Time :70 nsec

4.3.4 SDRAM

Used as Swath buffer, System working memory area, etc. when printing.
• Capacity: 16MByte (Export) / 32MByte (Domestic), expandable up to 144Mbyte (Export) /160MByte (Domestic)
• Optional Additional DIMM : 16MB / 32MB / 64MB /128MB
• Type : SDRAM 100MHz/133MHz , 16bit

4.3.5 Sensor Input Circuit

4.3.5.1. Paper Empty Sensing
The Paper Empty sensor (Photo Interrupter) on the engine board is monitored by the CPU. When the cassette is empty the printer flashes the red ERROR LED.

4.3.5.2. MP Sensing
Presence of paper in the MP tray is detected by operation of the MP Sensor (Photo Interrupter) on the frame. The CPU monitors this sensor to recognize paper in the MP, and paper is fed from MP if there is paper present.

4.3.5.3. Paper Feeding
When paper passes the actuator on the feed sensor, it is detected by the Photo interrupter. This is monitored by the CPU and this signal starts the process of creating the image after a certain delay time.
If the feed sensor is not detected within 1 sec. after paper is fed, a paper jam0 occurs. (Red ERROR LED is lit).

4.3.5.4. Toner Remain Sensing
The ML2250 does not have a toner sensor fitted

4.3.5.5. Paper Exit Sensing
This detects that paper exits cleanly from the set using an exit sensor on the engine board and actuator on the frame. The CPU detects the on/off time of the exit sensor and normal operation or jam status is reported.
If a Jam 2 error occurs the Red ERROR LED is lit.

4.3.5.6. Cover Open Sensing
The Cover open sensor is located on the power supply board. It is operated by a molded tab on the front cover. When the front cover is open the +24V and +5V supplies to the DC fan, solenoid, main motor, polygon motor part of LSU,
HVPS and LSU Laser diode are cut off.

4.3.5.7. DC FAN/Solenoid Driving Circuit
A fan driving circuit is controlled by the CPU via a transistor. It is automatically turned off when a machine enters sleep mode.
There are two solenoids, these are driven by signals from the CPU (MP and paper pick-up).

4.3.5.8. Motor Driving Circuit
The main motor drives the paper feed, developing unit, Fuser and Exit ass'y. It is driven by software which controls the acceleration, constant speed and deceleration profiles. The Motor is driven using an A3977 driver IC.

4.3.5.9 Transfer

The charging voltage, developing voltage and the transfer voltage are controlled by PWM (Pulse Width Modulation). Each output voltage is changeable according to the PWM duty cycle. The transfer voltage used when the paper passes the transfer roller is decided by environment recognition. The resistance value of the transfer roller changes due to the surrounding environment in the room or within the set, this change in resistance in turn changes the value of the voltage due to loading. This voltage is fed back into the set through the A/D converter. Based on this fed back value the PWM cycle is changed to maintain the required transfer voltage

4.3.5.10 Fusing

The temperature of the heat roller's surface is detected according to the resistance value of the thermistor. The thermistor resistance is measured using the A/D converter and thus the CPU can determine the temperature of the heat roller. The AC power is controlled by comparing the target temperature to the value from the thermistor. If the value from the thermistor is out of the controlling range while controlling the fusing process, the error stated in the table occurs. (For the domestic model, the Q-PID method has been applied.)

• Error Type

Error	Description	DCU	LED Display
OPEN HEAT ERROR	-When warming up it has been lower than 68°C for more than 28 seconds	60	All LED blinking
LOW HEAT ERROR	-Standby It has been lower than 80°C for more than 10 seconds -Printing Up to 2 consecutive pages : It has been lower than 145°C For more than 4 seconds. From 3 consecutive pages : It has been 25°C lower than the fixed fusing temperature for more than 4 seconds. It has been higher than 220˚C over 3 seconds	62	All LED blinking
OVER HEAT ERROR	It has been higher than 220°C for more than 3 seconds	68	All LED blinking

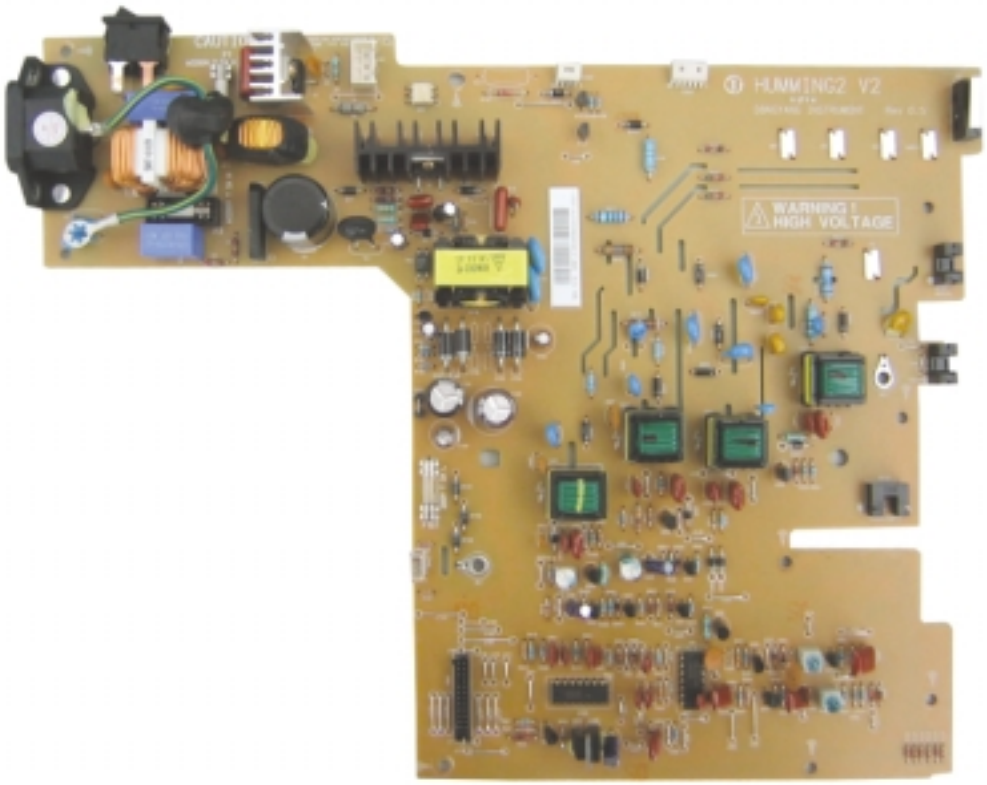
4.3.5.10 LSU

The LSU consists of the LD (Laser Diode) and the polygon motor control. When the printing signal occurs, the LD is turned on and the polygon motor is enabled. When the light sensor detects the beam, Hsync occurs. When the polygon motor speed becomes a normal, LReady occurs. If these two conditions are satisfied the LSU is judged to be ready. If the two conditions are not satisfied, the error shown in the table below occurs.

Error Type	Description	DCU Display Value
Polygon Motor Error	When the polygon motor speed doesn't become steady	95
Hsync Error	The polygon motor speed is steady but the Hsync is not generated	96

4.4 SMPS & HVPS

The SMPS and HVPS are on one integrated board.
The SMPS supplies the DC power to the system. It takes either 110V or 220V and outputs the +5V and +24VS supplies to the main and other PBAs.
The HVPS creates the high voltage of THV/MHV/Supply/Dev and supplies it to the toner cartridge. The CPU is used to modify some of these voltage settings to provide the ideal voltages to create the image.
The HVPS part uses the 24V and outputs the high voltage for THV/MHV/BIAS and the outputted high voltage is supplied to the toner, OPC cartridge and transfer roller.



4.4.1 HVPS (High Voltage Power Supply)

1) Transfer High Voltage (THV+)

- Input Voltage : 24 V DC ± 15%
- Output Voltage : MAX +5.0KV ± 5 %,(Duty Variable, no loading)
  -1.2KV ±15% (when cleaning,200 MΩ)
- Output Voltage Trigger : 6.5 *u*A
- Input contrast of the Voltage stability degree :under ± 5 % (fluctuating input 21.6V~26.4V)
  Loading contrast : ± 5 % or less
- Output Voltage Rise Time : 100 ms Max
- Output Voltage Fall Time : 100 ms Max
- Transfer voltage range as environment varies : +650 V(Duty 10%) ~ 5 KV (Duty 90%)
- Environment Recognition : THV-PWM ACTIVE is a transfer active signal. It detects the resistance of the transfer roller / OPC combination by applying the THV voltage (fixed value) and then measuring the OPC voltage. This allows the resistance to be determined. The resistance is affected by changes in temperature and humidity. A lookup table in the control program is then used to enable the THV voltage to be adjusted to compensate for the environmental conditions.
- Output Voltage Control Method : Transfer Output Voltage is output and controlled by changing the Duty cycle of the THV PWM Signal. 10% Duty :+650V,90% Duty : +5KV±5%

2) Charge Voltage (MHV)

- Input Voltage : 24 V DC ± 15%
- Output Voltage : -1.3KV ~-1.8KV DC ± 50V
- Output Voltage Rise Time : 50 ms Max
- Output Voltage Fall Time : 50 ms Max
- Output Loading range : 30 MΩ ~1000 MΩ
- Output Control Signal (MHV-PWM): CPU is HV output when PWM is Low

3)Cleaning Voltage (THV-)

- The (+)Transfer Voltage is not output because the THV PWM is controlled with high.
- The (-)Transfer Voltage is output because the THV-Enable Signal is controlled with low
- The output fluctuation range is big because there is no Feedback control.

4) Developing Voltage (DEV)

- Input Voltage : 24 V DC ± 15%
- Output Voltage: -200V ~ -600V DC ±20V
- Output Voltage Fluctuation range: PWM Control
- Input contrast of the output stability degree :±5 % or less
  Loading contrast : ± 5 % or less
- Output Voltage Rise Time : 50 ms Max
- Output Voltage Fall Time : 50 ms Max
- Output Loading range : 10MΩ ~ 1000 MΩ
- Output Control Signal (BIAS-PWM) : the CPU output is HV output when PWM is low.

5) Supply

- Output Voltage :-400 V ~-800V DC ±50 V(ZENER using,DEV)
- Input contrast of the output stability degree :under ± 5%
  Loading contrast : ± 5% or less
- Output Voltage Rise Time : 50 ms Max
- Output Voltage Fall Time : 50 ms Max
- Output Loading range : 10 MΩ ~ 1000 MΩ
- Output Control Signal (BIAS-PWM) : the CPU is HV output when PWM is low.

4.4.2 SMPS(Switching Mode Power Supply)

It is the power source of entire system. It is assembled by an independent module, so it is possible to use for common use. It is mounted at the bottom of the set.
It is consisted of the AMPS part, which supplies the DC power for driving the system, and the AC heater control part, which supplies the power to fuser. SMPS has two output channels. Which are 3.3V and +24V.

1) AC Input

- Input Rated voltage : AC 220V ~ 240V AC 120V / AC 220V(EXP version)
- Input Voltage range : AC 198V ~ 264V AC 90V ~ 135V / AC 198V ~ 264V(EXP version)
- Rated Frequency : 50/60 Hz
- Frequency range : 47 ~ 63 Hz
- Input Current : Under 4.0A rms/2.0A rms
  (When the fuser lamp is off and input / output voltages are in range)

2) Rated Output Power

NO	Item	CH1	CH2	CH3	Remark
1	Channel name	+3.3V	+5V	+24.0V	
2	CONNECTOR PIN	CON 3 3.3V PIN: 3, 4 GND PIN: 5, 6	CON3 5V PIN : 8 GND PIN: 7	CON 3 24V PIN: 11, 12, 13 GND : 9. 10	
3	Rated output	3.3V ± 5% (3.2 ~ 3.4V)	+5V ± 5% (4.75 ~ 5.25V)	+24V ± 10% (21.6 ~ 26.4V)	
4	Maxi output current	1.0 A	0.14A	2.0 A	
5	Peak loading current	1.5 A	0.14A	2.5 A	1ms
6	Ripple noise voltage	Under 100mVp-p	100mVp-p	Under 500mVp-p	
7	Maximum output	3.3W	0.35W	48W	
8	Peak output	4.95W	0.7W	60W	1ms
9	Protection for loading shortage and overflowing current	-		-	

3) Consumption Power

NO	Item	CH1 (+3.3V)	CH2 (+5V)	CH3 (24V)	System
1	Stand-By	1.0 A	0.07A	0.4 A	AVG : 55 Wh
2	PRINTING	1.0 A	0.14A	2.0 A	AVG : 280 Wh

4.5 Engine F/W

4.5.1 Feeding

If feeding from the cassette the drive of the pickup roller is controlled by controlling the pick-up solenoid. The on/off of the solenoid is controlled by controlling the general output port or the external output port. If feeding from the manual feeder the set decides to feed the paper according to the operation of the manual sensor, and by driving the main motor, insert the paper in front of the feed sensor. When paper moves the occurrence of a paper jam is judged as below.

ITEM	Description
JAM 0	*IThis is an indcation that the leading edge of the paper doesn't pass the feed sensor. -After the picking up cycle paper does not enter the set because no paper is picked up. -After the picking up cycle paper enters the set but it does not reach the feed sensor in certain time due to slip, etc. -After the picking up cycle if the feed sensor is not on re-pick up. After re-picking up, if the feed sensor is not on after certain time, it is JAM 0. -Even though the paper reaches to the feed sensor, the feed sensor is not ON.
JAM 1	*This is an indication that the leading edge of the paper has already passes the feed sensor. -After the leading edge of the paper passes the feed sensor the trailing edge of the paper does not pass the feed sensor within a certain time. (The feed sensor cannot be OFF during this time) -After the leading edge of the paper passes the feed sensor the paper does not reach the exit sensor within a certain time. (The exit sensor cannot be ON during this time)
JAM 2	*The paper exists between the feed sensor and the exit sensor. -After the trailing edge of the paper passes the feed sensor the trailing edge of the paper does not pass the exit sensor within a certain time.

MEMO

5. Disassembly and Reassembly

5.1 General Precautions on Disassembly

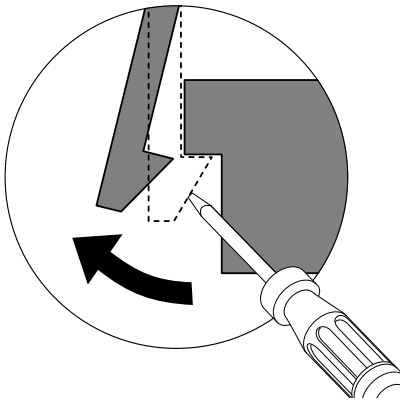
When you disassemble and reassemble components, you must use extreme caution. The close proximity of cables to moving parts makes proper routing a must.
If components are removed, any cables disturbed by the procedure must be restored as close as possible to their original positions. Before removing any component from the machine, note the cable routing that will be affected.

Whenever servicing the machine, you must perform as follows:

1. Check to verify that documents are not stored in memory.
2. Be sure to remove the toner cartridge before you disassemble parts.
3. Unplug the power cord.
4. Use a flat and clean surface.
5. Replace only with authorized components.
6. Do not force plastic-material components.
7. Make sure all components are in their proper position.

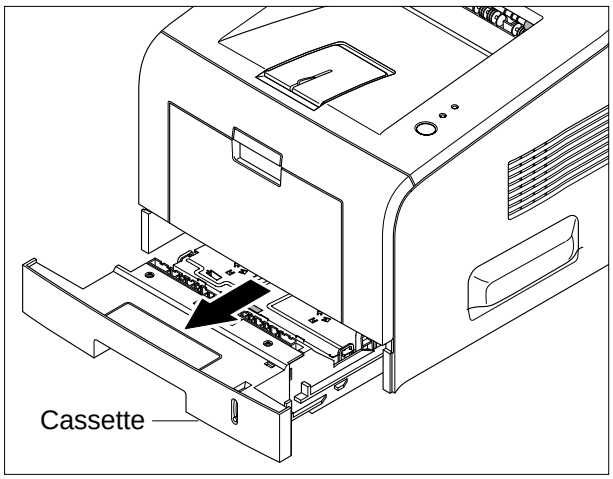
Releasing Plastic Latches

Many of the parts are held in place with plastic latches. The latches break easily; release them carefully.
To remove such parts, press the hook end of the latch away from the part to which it is latched.

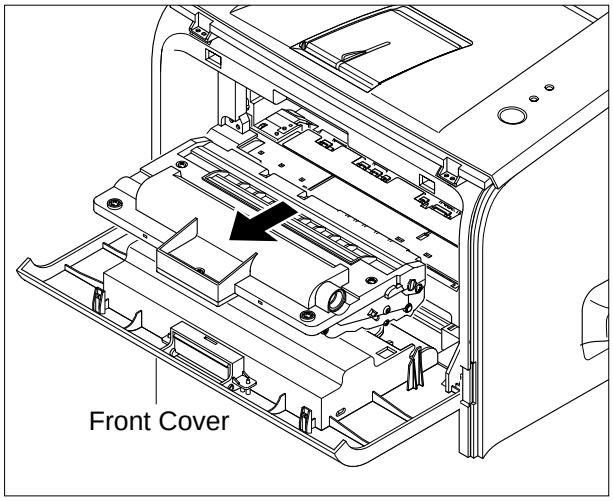


5.2 Front Cover

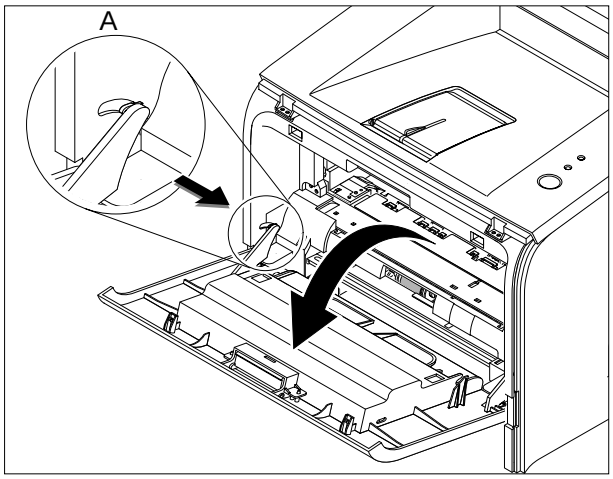
1. Pull the Cassette out of the printer.



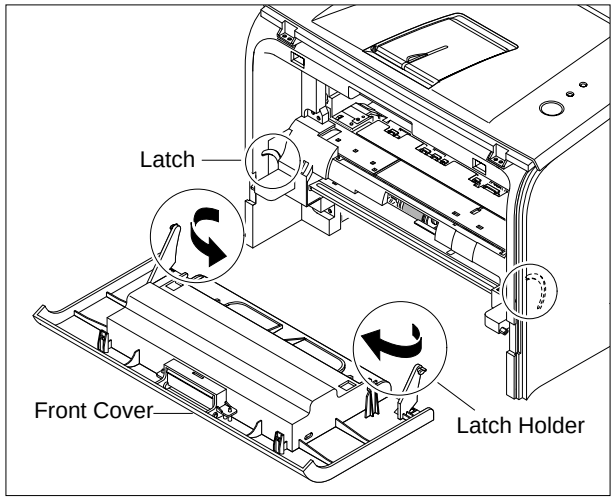
2. Open the Front Cover push the toner cartridge down and remove it from the printer.



3. Release the hinges by pulling inwards as shown in "A" below

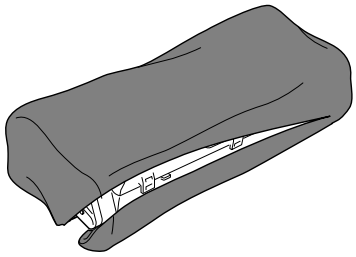


4. Pull the front cover away from the machine.



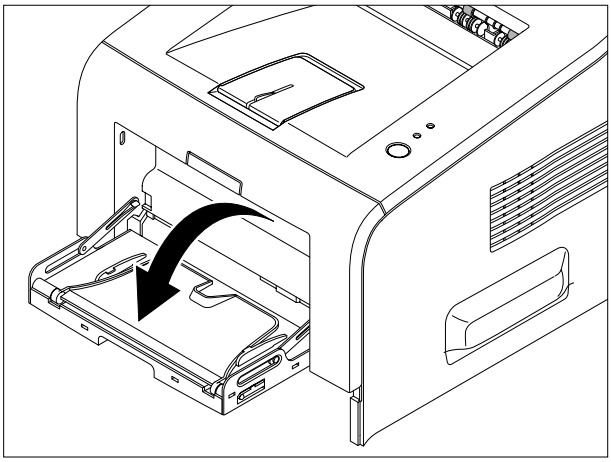
Maintaining Print Quality.

- To prevent damage to the toner cartridge, do not expose it to light for more than a few minutes.

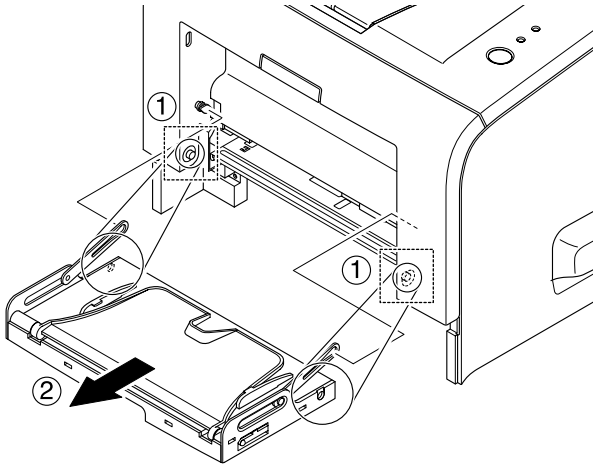


5.3 MP-Tray Ass'y

1. Open the Tray Ass'y

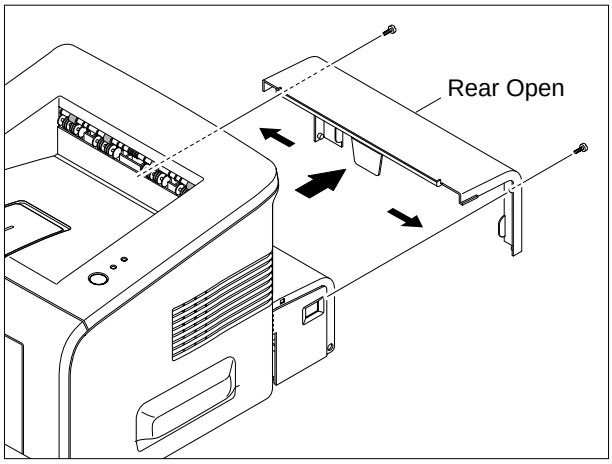


2. Carefully bend the clear plastic hinge supports (①) to release them from the guide hooks. Push the Front cover side outwards to release the MP Tray hinge.

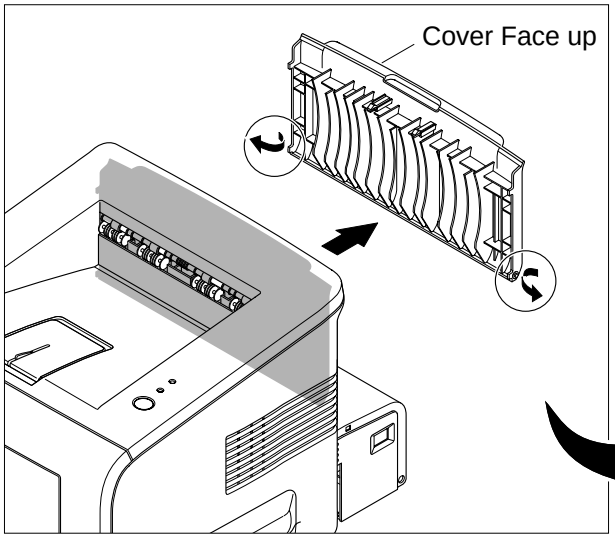


5.4 Rear Cover

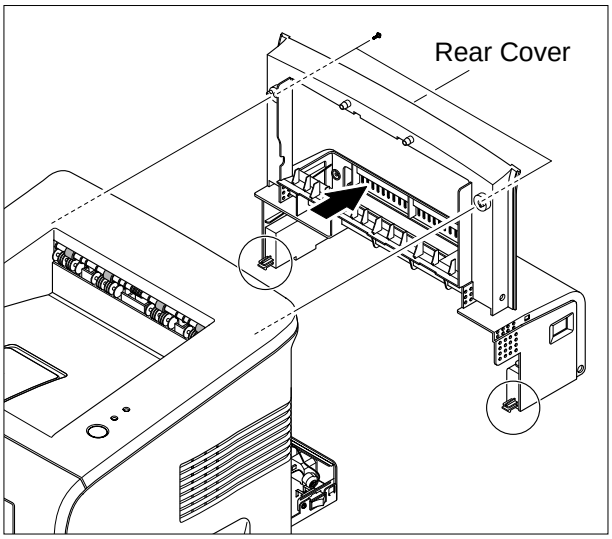
1. Release two screws and remove the Option Cover Ass'y.

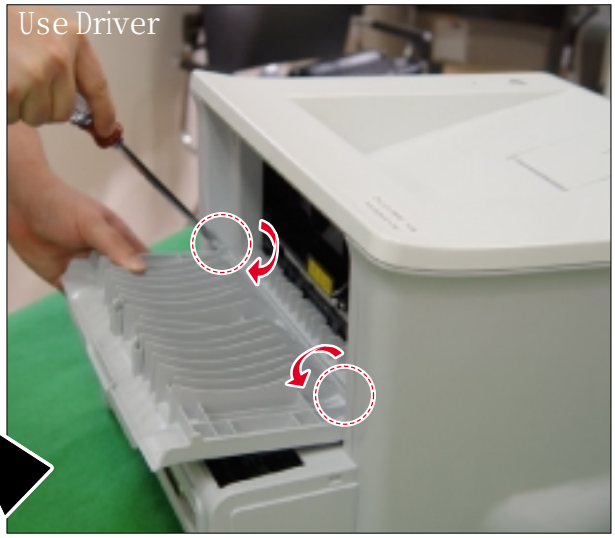


2. Remove the Cover Face up in the direction of arrow.

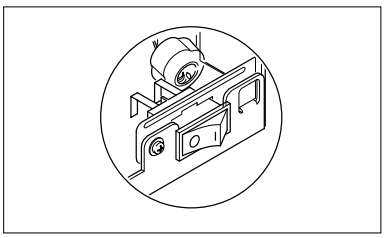


3. Release two screws, as shown below and remove up the "Rear Cover" (release plastic "HOOK" carefully)

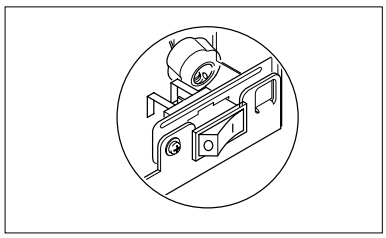




Note. To make Disassembly and Reassembly simpler.



• Disassembly - Switch in OFF Position

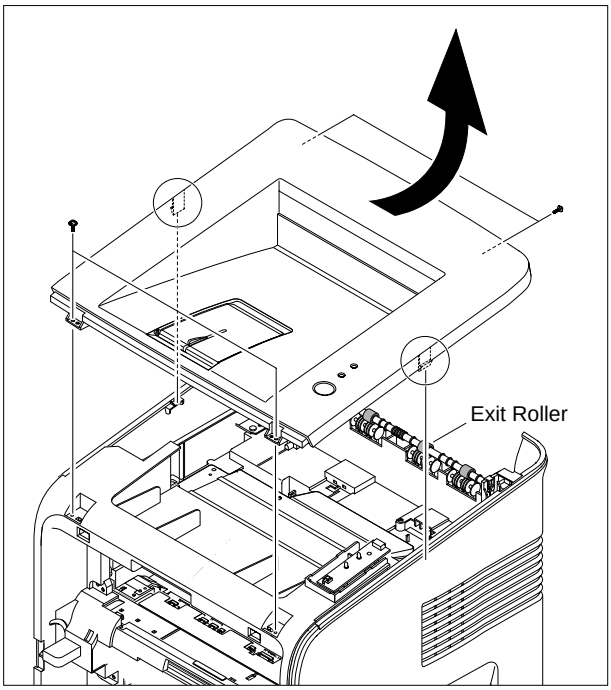


• Reassembly – Switch in ON position

5.5 Top Cover

1. Before you remove the Top Cover Ass'y, you should remove:
   - Front Cover
   - Rear Cover

2. Remove four screws securing the Top Cover Ass'y, as shown below.



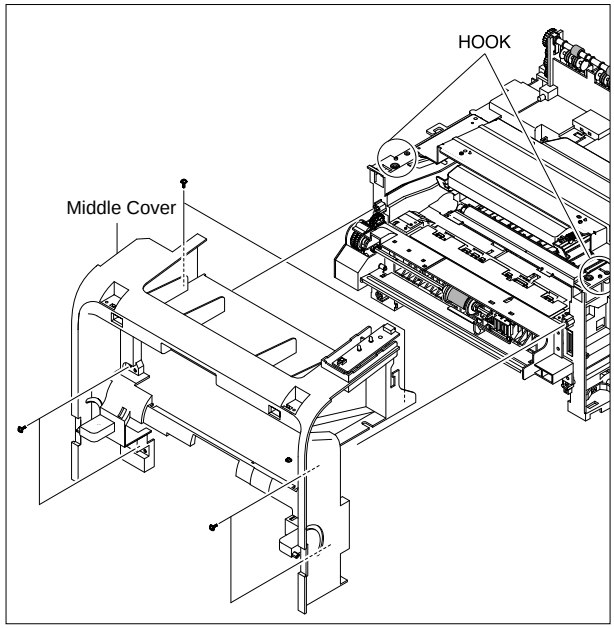
Take Care.

When removing or refitting the top cover take care not to damage the Exit Roller.

5.6 Middle Cover

1. Before you remove the Middle Cover, you should remove:
   - Front Cover
   - Rear Cover
   - Top Cover

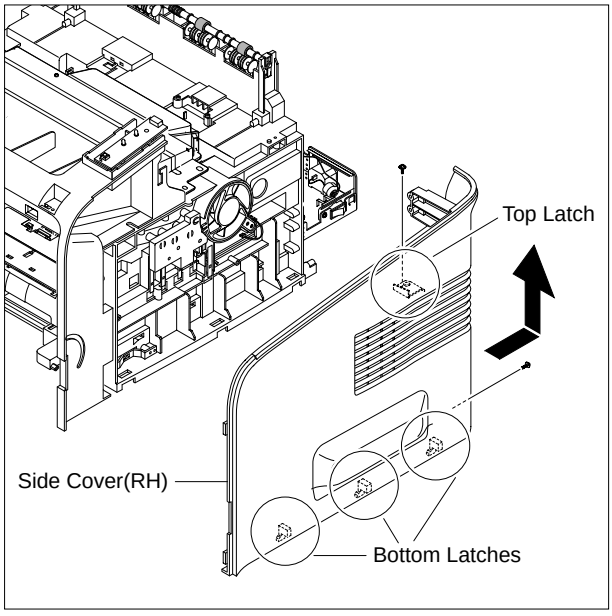
2. Disconnect the OPE harness and remove four screws securing the Base Frame, as shown below.



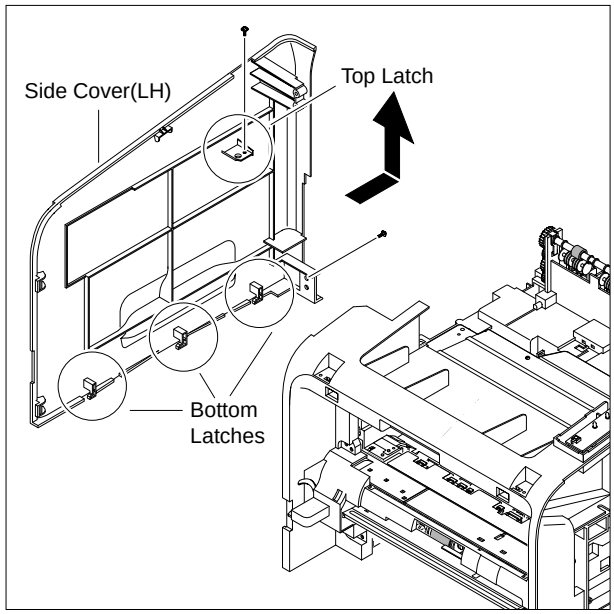
5.7 Side Cover(LH, RH)

1. Before you remove the Side Cover(LH, RH), you should remove:
   - Front Cover
   - Rear Cover
   - Top Cover

2. Remove the two screws and release the latches from the Frame Ass'y in the direction of the arrow, then remove the side cover(RH).



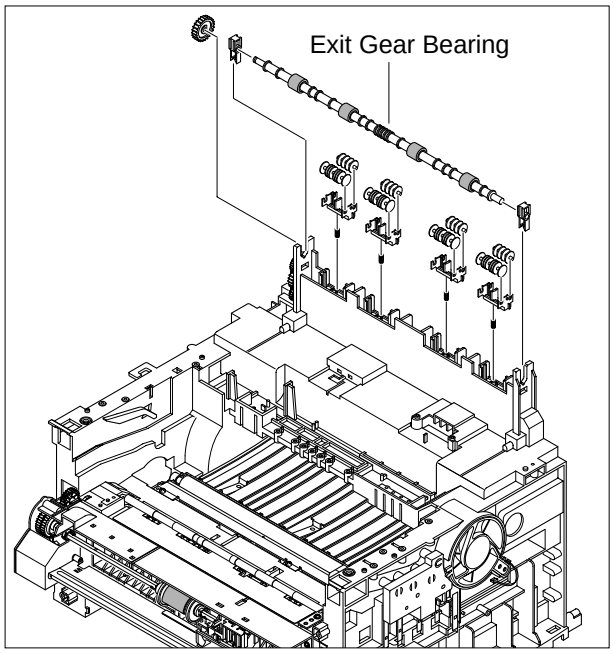
3. Remove the two screws and release the latches from the Frame Ass'y in the direction of the arrow, then remove the side cover(LH).



5.8 Exit Roller

1. Before you remove the Exit Roller, you should remove:
   - Front Cover
   - Rear Cover
   - Side Cover(LH, RH)
   - Top Cover

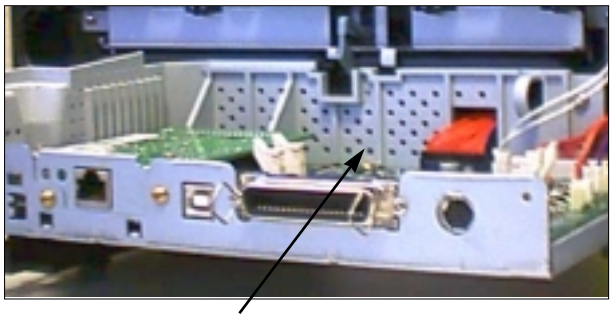
2. Remove the Exit Gear, Bearing and Exit Roller as shown below.



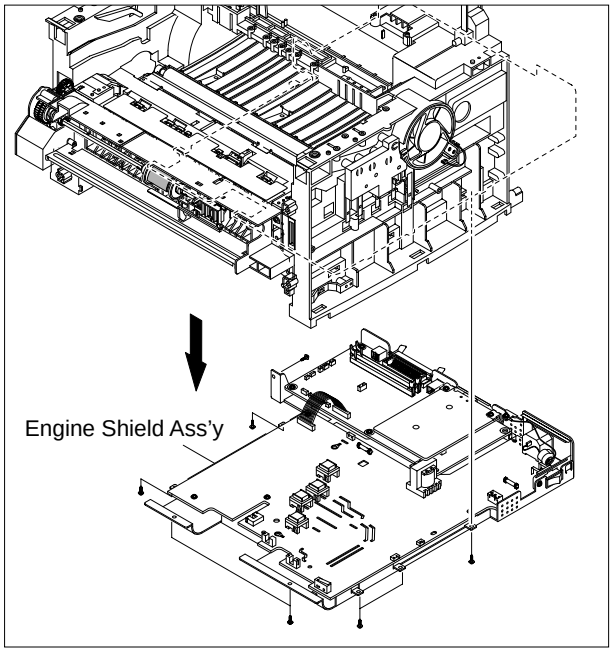
5.9 Engine Shield Ass'y & Exit Board

1. Before you remove the Engine Shield Ass'y, you should remove:
   - Front Cover
   - Rear Cover
   - Side Cover(LH, RH)
   - Top Cover

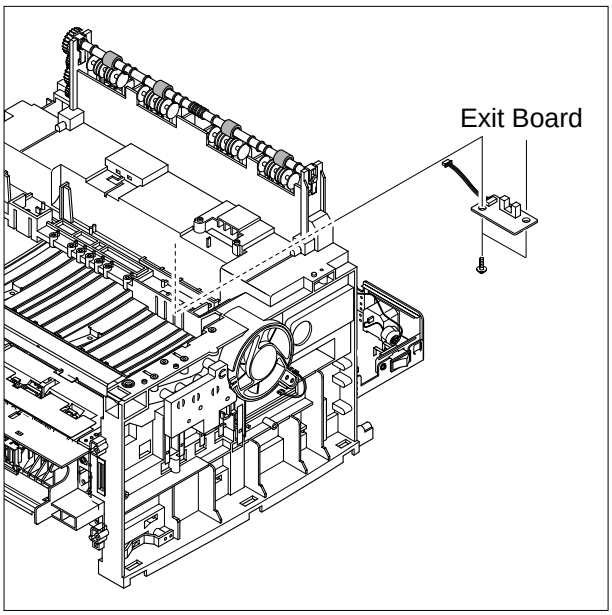
2. Release 1 screw and remove the SMPS shield Engine Shield Ass'y



3. Remove the twelve screws securing from the Engine Shield Ass'y and unplug the all connectors. Then take the Engine Shield Ass'y.



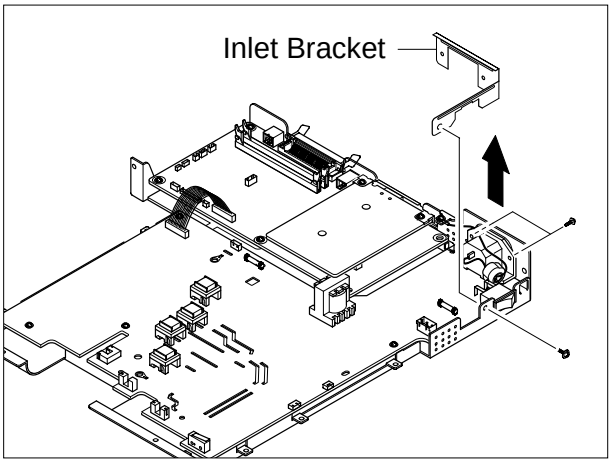
4. Remove the two screws and remove the Exit Board.



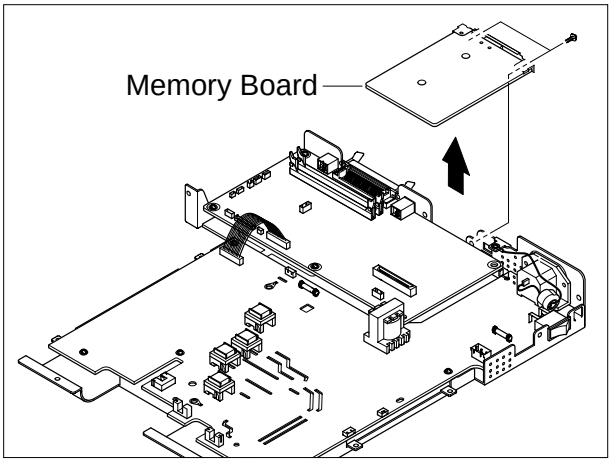
5.10 SMPS

1. Before you remove the SMPS, you should remove:
   - Front Cover
   - Rear Cover
   - Side Cover(LH, RH)
   - Top Cover

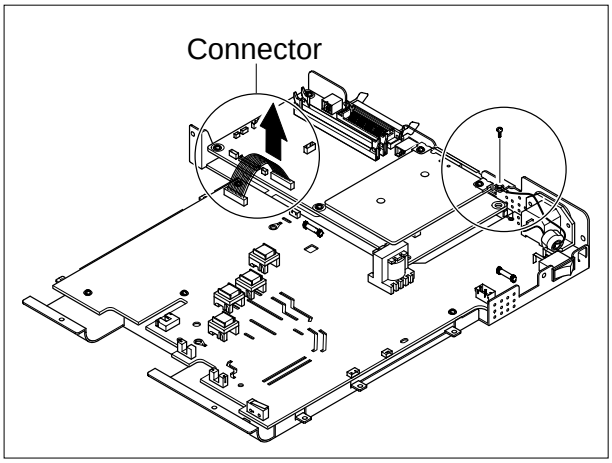
2. Unplug one connector and remove three screws then take the Inlet Bracket out.



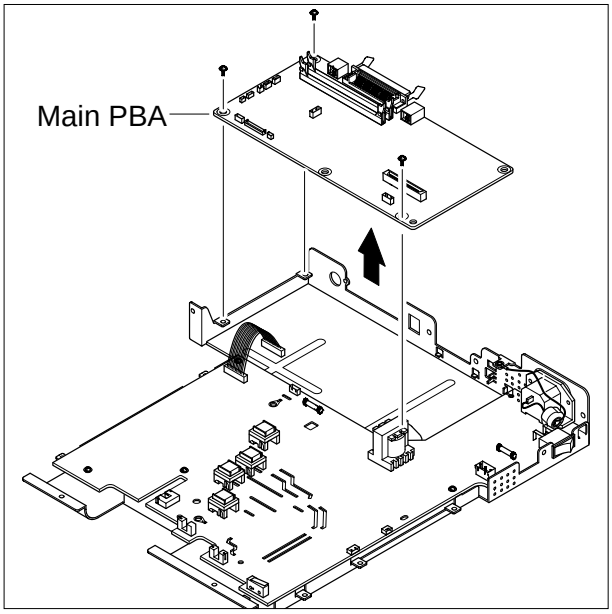
3. Remove the two screws and remove the Network Board.



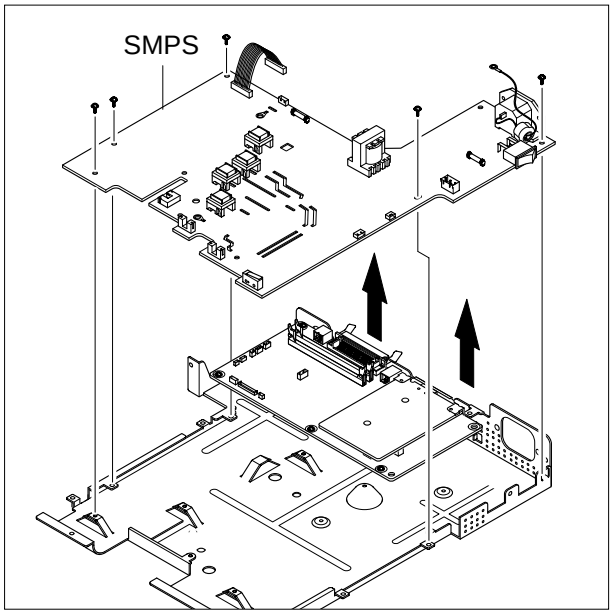
4. Unplug one connector from the Main PBA.



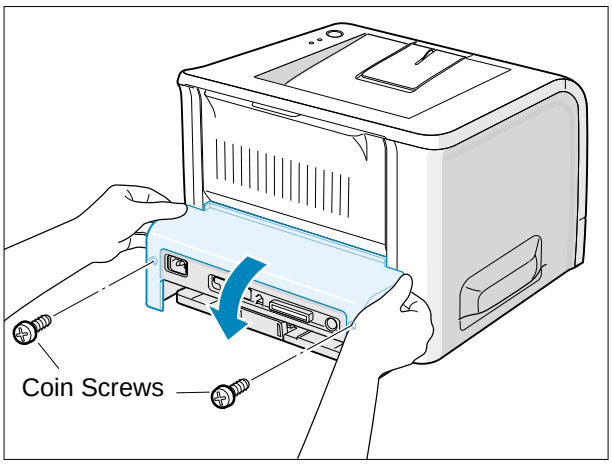
5. Remove the six screws and take the Main Board.

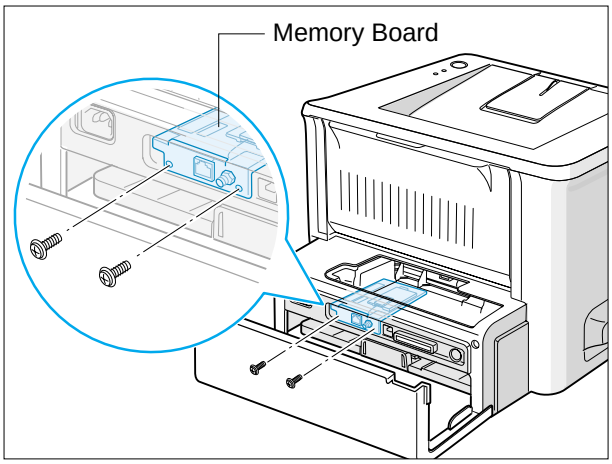


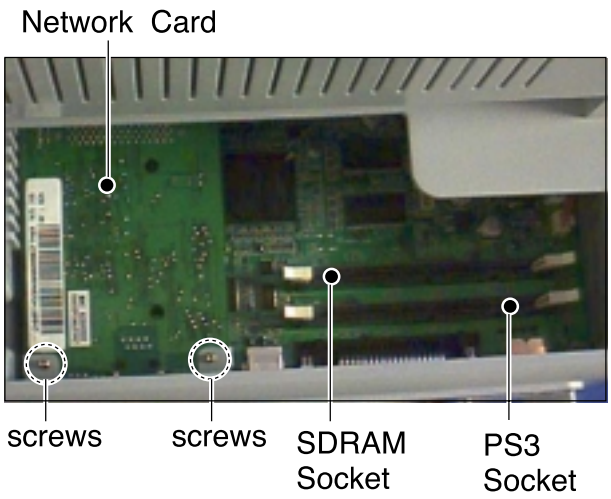
6. Remove seven screw and take out the SMPS Unit.



7. If you only need to remove the optional memory modules or the network card this can be chieved by removing ONLY the Option Cover.



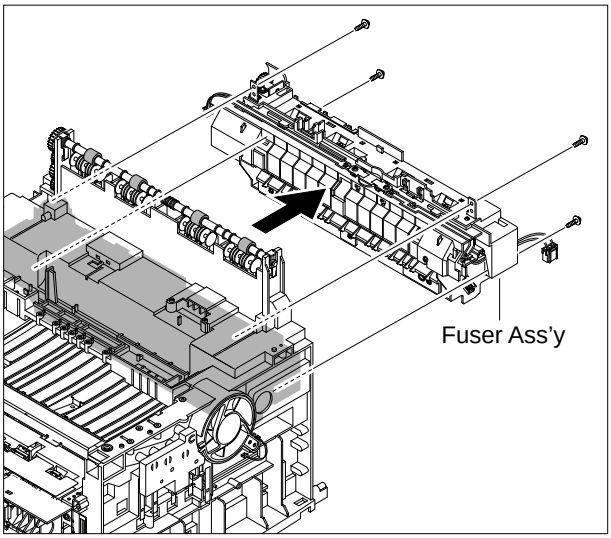




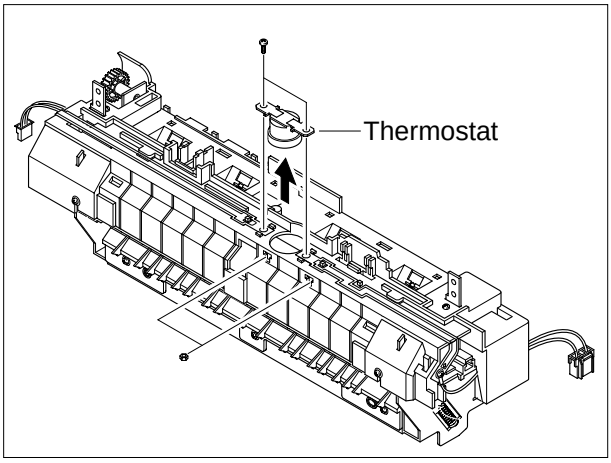
5.11 Fuser Ass'y

1. Before you remove the Fuser Ass'y, you should remove:
   -Rear Cover

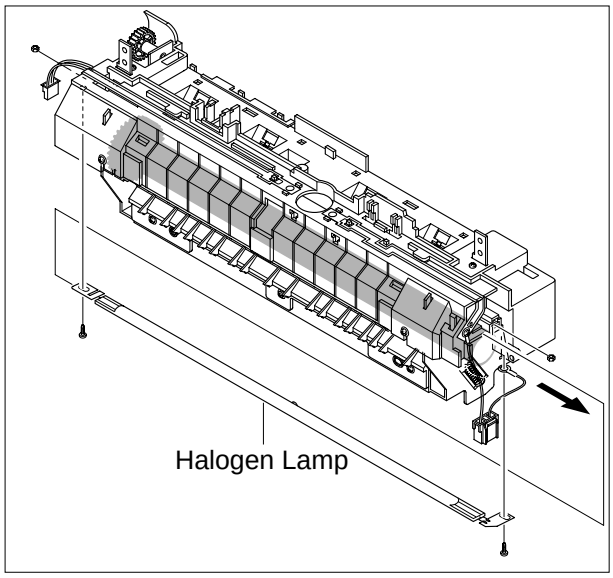
2. Unplug the four connectors from the Main PBA and SMPS, as shown below. Then remove the four screws securing the Fuser Ass'y and remove it.



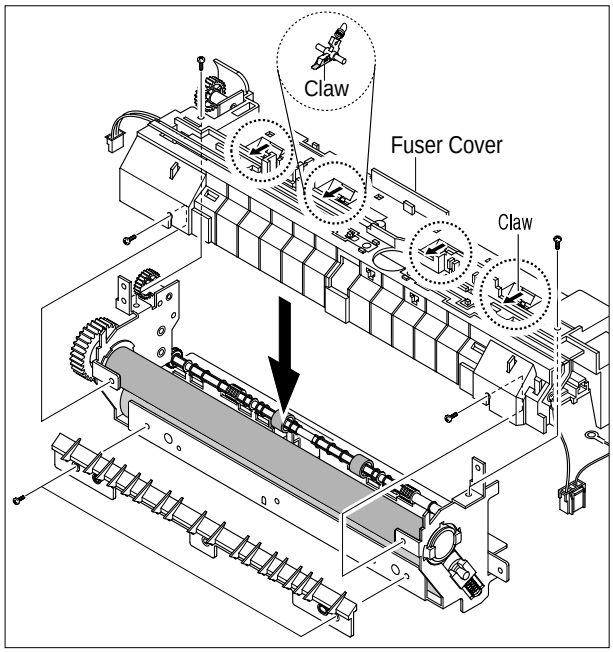
3. Remove the two screws securing the Thermostat. Then lift the Thermostat out.



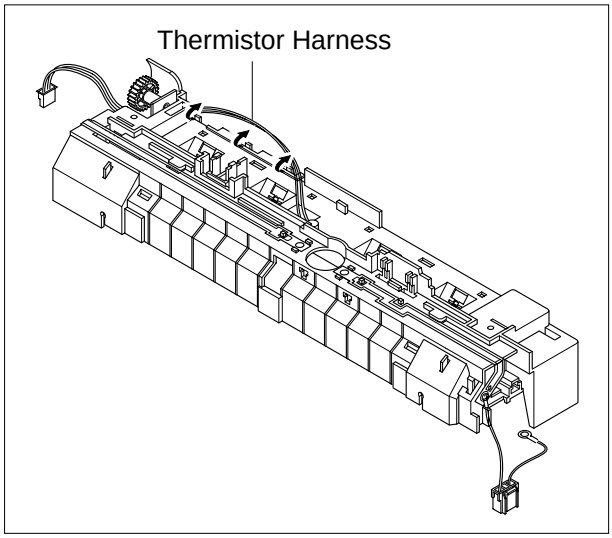
4. Remove the two screws securing the Halogen Lamp. Then take out the Halogen Lamp from the Heat Roller, as shown below.



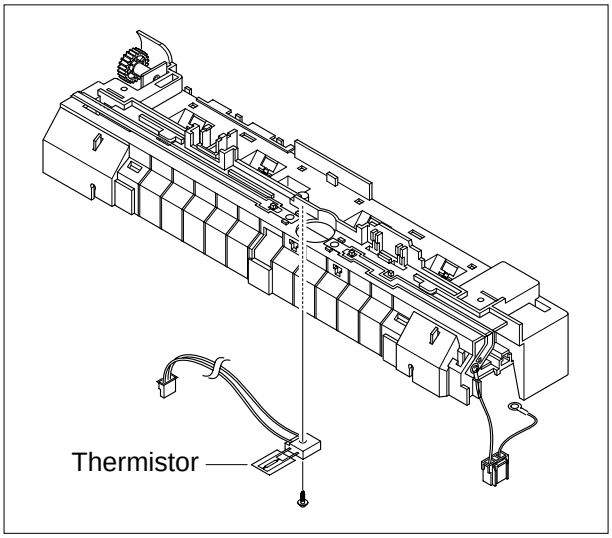
5. Remove four screws securing the Fuser Cover and two screws securing the Guide Input to dismantle the fuser unit..



6. Unwrap the Themister Harness, as shown below.



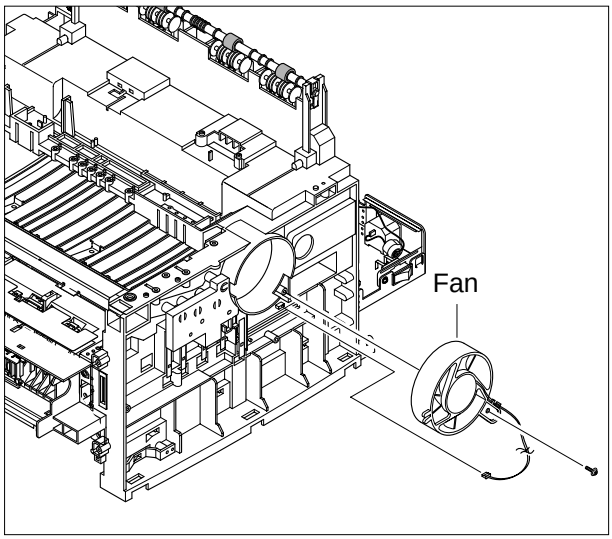
7. Remove the one screws securing the Thermister and remove it, as shown below.



5.12 Fan

1. Before you remove the Fan, you should remove:
   - Front Cover
   - Rear Cover
   - Side Cover(RH)
   - Top Cover

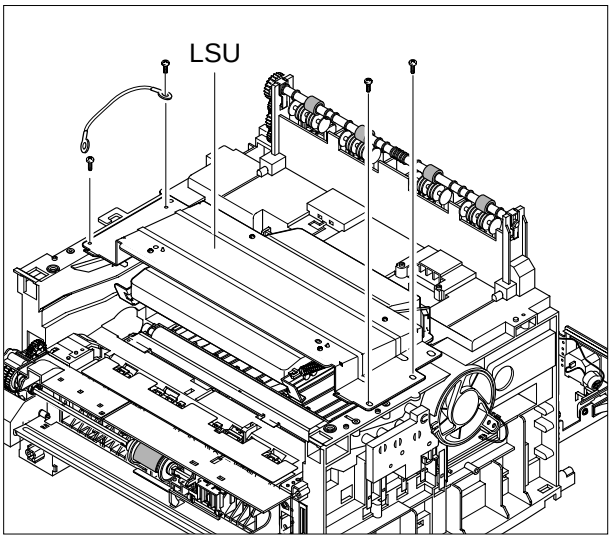
2. Unplug one connector from the SMPS and remove one screw as shown below. Then take out the Fan.



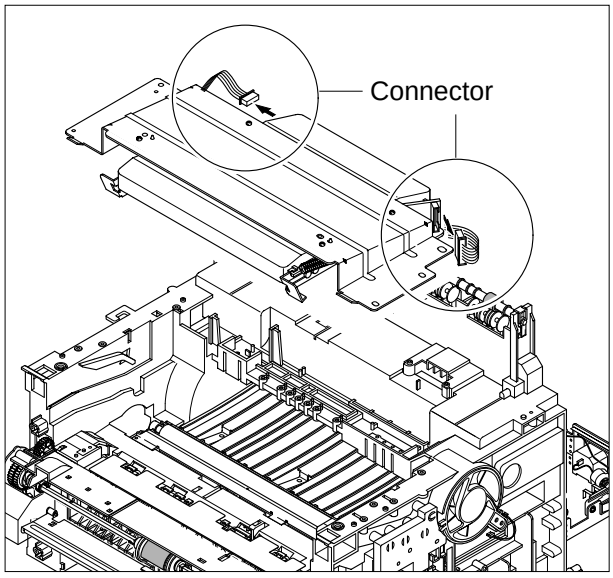
5.13 LSU

1. Before you remove the LSU, you should remove:
   - Front Cover
   - Rear Cover
   - Side Cover(RH)
   - Top Cover

2. Remove the four screws securing the LSU and remove it.



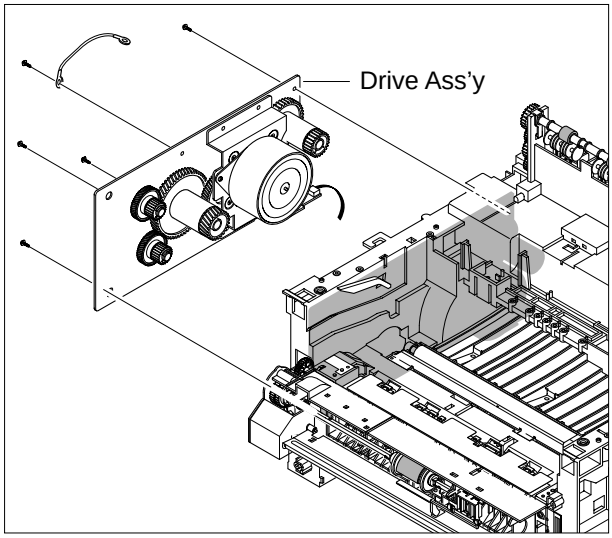
3. Unplug the two connectors From the LSU, as shown below.



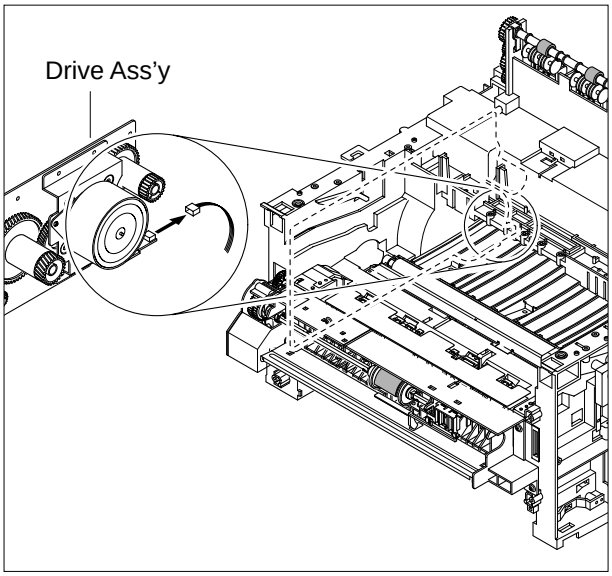
5.14 Drive Ass'y

1. Before you remove the Drive Ass'y, you should remove:
   - Front Cover
   - Rear Cover
   - Side Cover(LH)
   - Top Cover

2. Remove six screws from the Drive Ass'y. Caution The six screws have numbers stamped into the Drive Ass'y base plate. When refitting the Drive Ass'y tighten the screws the order they are numbered.



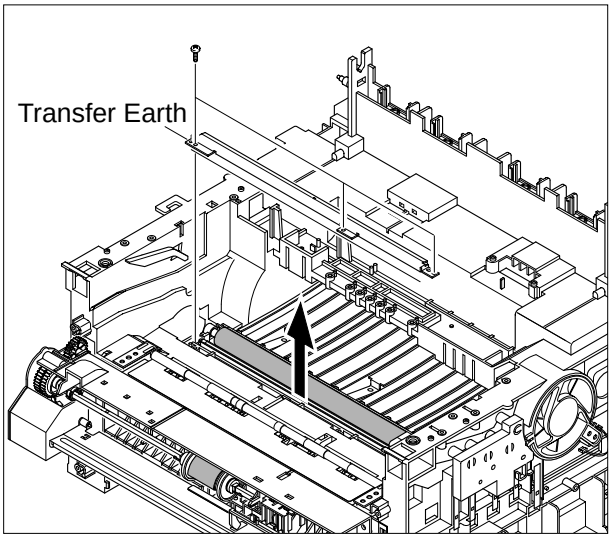
3. Unplug one connector From the Driver Ass'y.



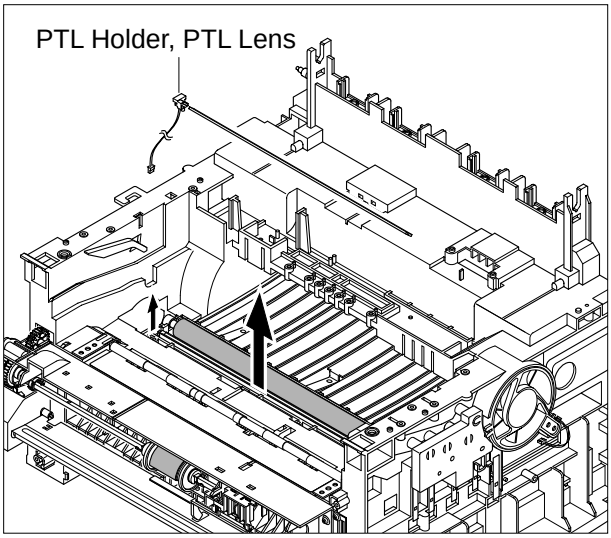
5.15 Transfer Ass'y

1. Before you remove the Transfer Ass'y, you should remove:
   - Front Cover
   - Rear Cover
   - Middle Cover
   - Side Cover(LH, RH)
   - Top Cover

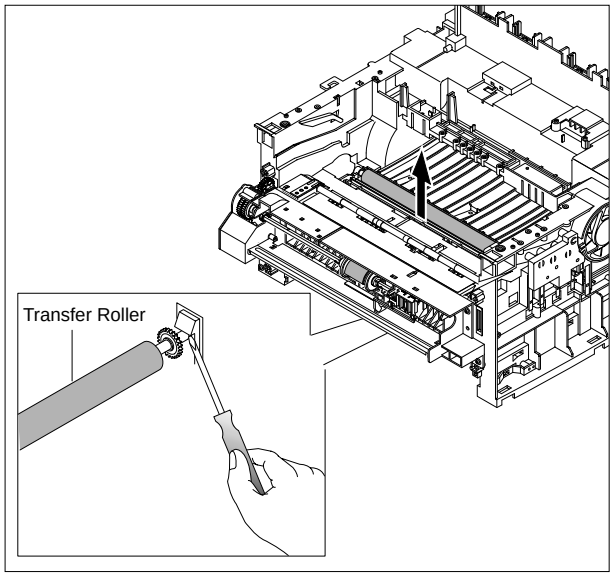
2. Remove three screws and take the Transfer Earth out.



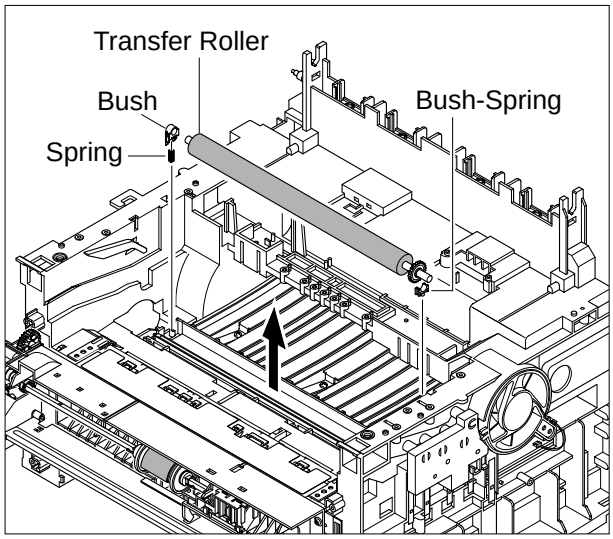
3. Unplug the PTL Holder connector then remove the PTL Holder and PTL Lens, as shown below.



4. Unlatch the Transfer Roller as shown below and remove it.



5. Unlatch the two transfer roller vushes and remove them as shown below.

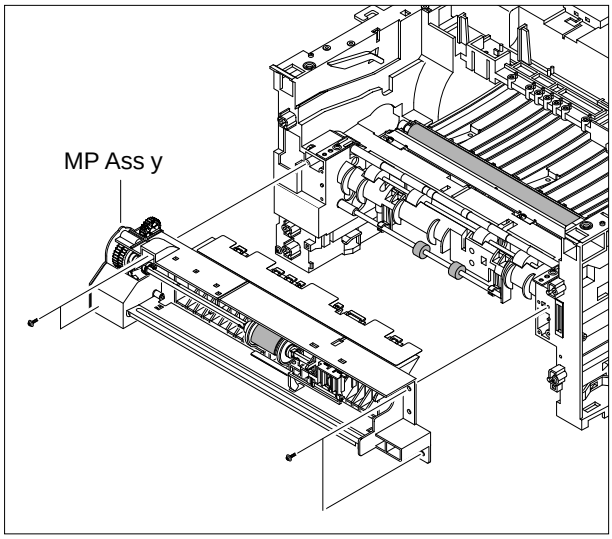


5.16 MP Ass'y and Feed Roller

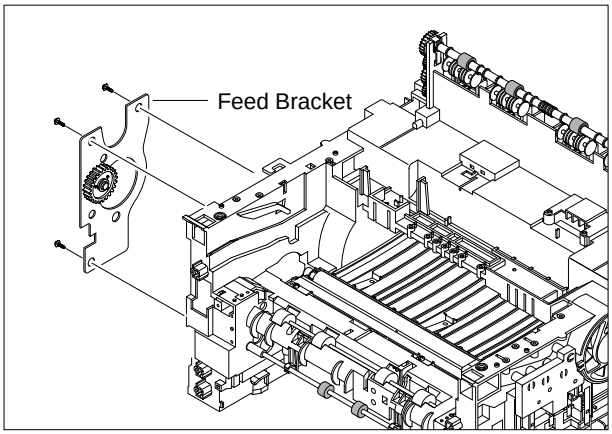
1. Before you remove the Feed Ass'y, you should remove:
   - Front Cover
   - Rear Cover
   - Middle Cover
   - Side Cover(LH, RH)
   - Top Cover

2. Disconnect the MP Solenoid and MP Sensor harness from the main PBA. Remove the four screws from the MP Ass'y Front and take it out taking care to thread the cables through the frame.

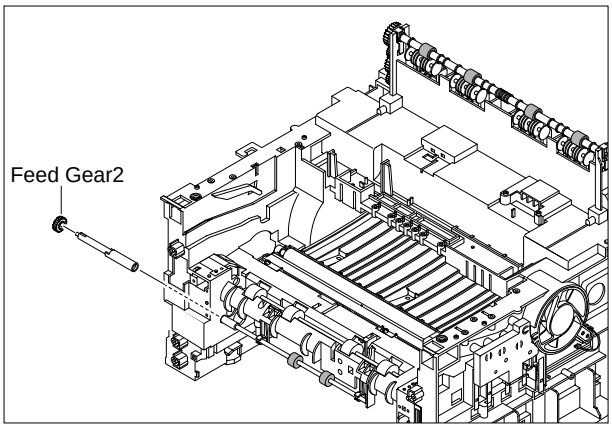
3. Remove the four screws from the MP Ass'y and take it out.



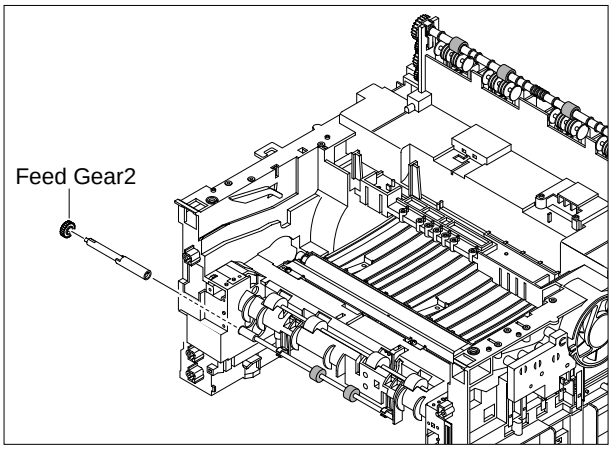
4. Remove the two screws from the Guide Paper Spring.



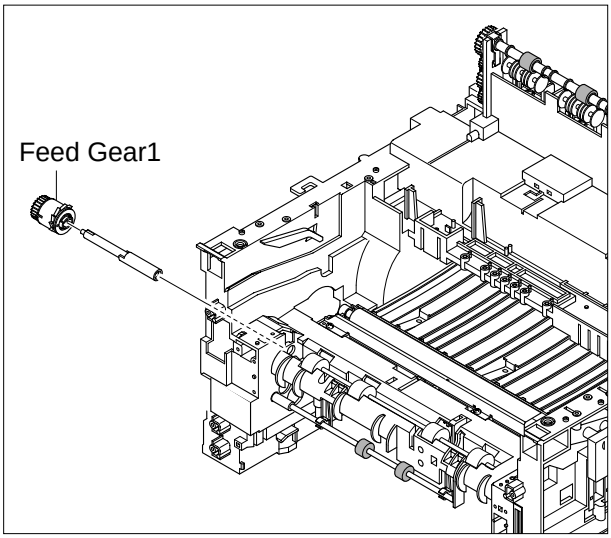
5. Remove the three screw from the Feed Bracket and take it out.



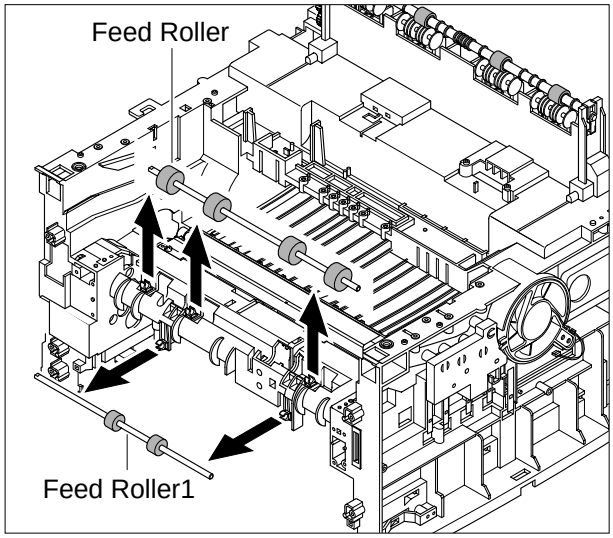
6. Remove the Feed Gear2, as shown below.



7. Remove the Feed Gear1, as shown below.



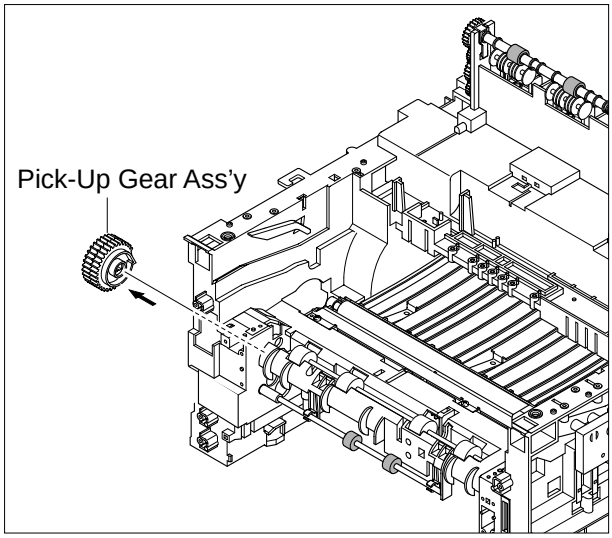
8. Remove the Feed Roller and Feed Roller1, as shown below.



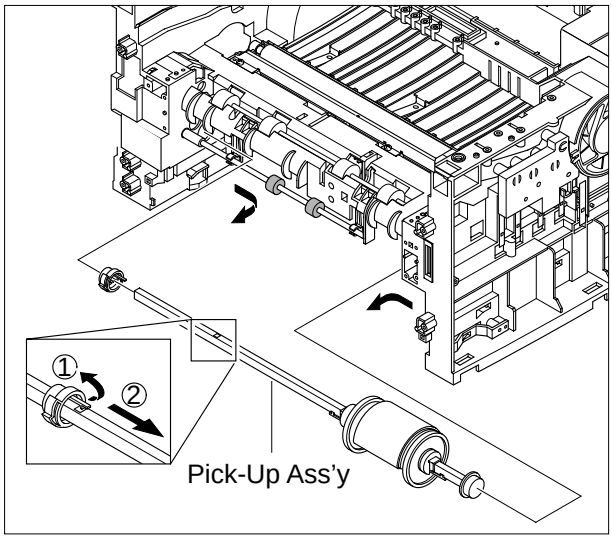
5.17 Pick-Up Ass'y & Solenoid

1. Before you remove the Pick-Up Ass'y & Solenoid, you should remove:
   - Front Cover
   - Rear Cover
   - Middle Cover
   - Side Cover(LH, RH)
   - Top Cover

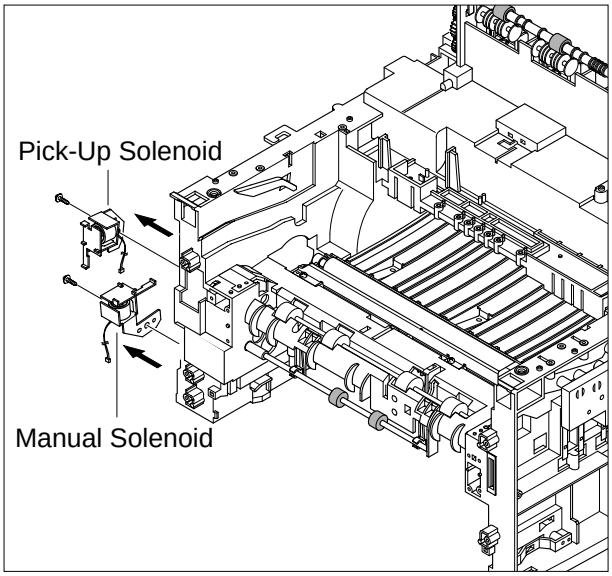
2. Remove the Pick-Up Gear Ass'y as shown below.



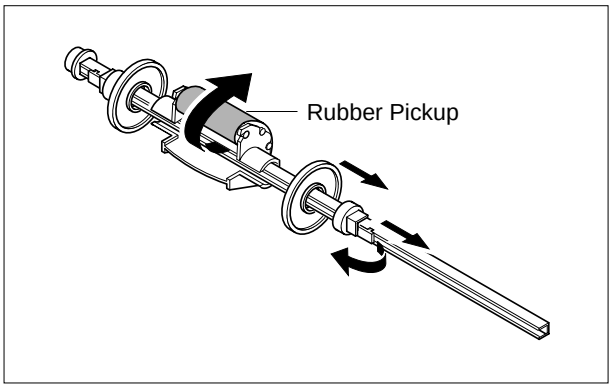
3. Remove the Pick-Up Ass'y as shown below.



4. Disconnect the Main Clutch and Regi Clutch harness from the main board. Remove two screws then remove the two solenoids talking care to thread the cables through the frame.

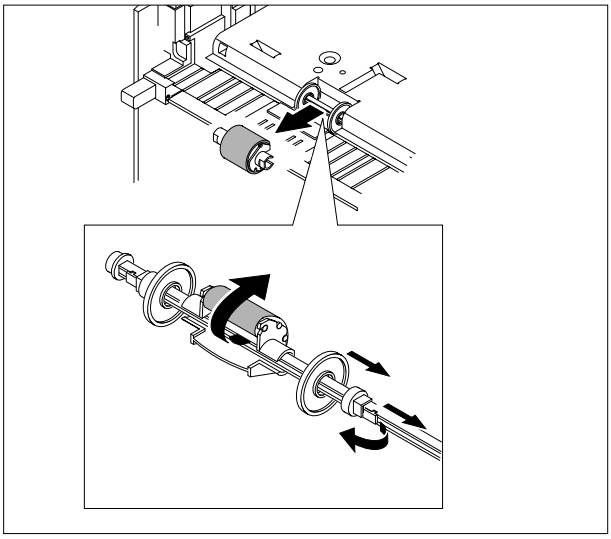


5. Remove the rubber pickup from the Pink-Up Roller, as shown below.

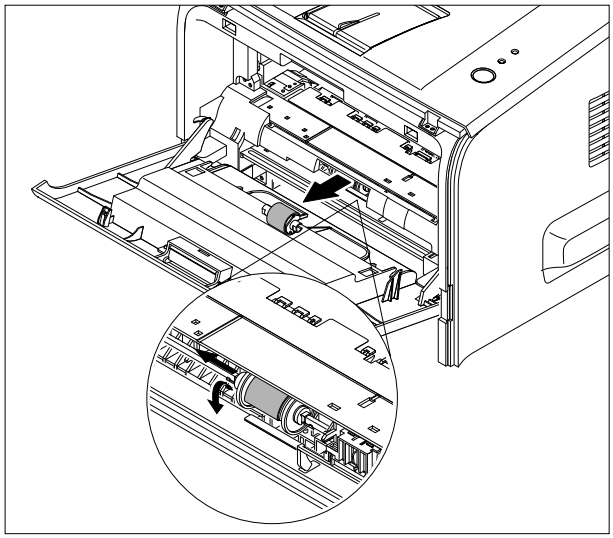


6. It is a simple matter to replace the MP Pickup Roller and the main cassette Pickup Roller without dismantling the set.
   In both cases first remove the main paper cassette, toner cartridge and front cover.

a) In order to replace the main cassette Pickup Roller
   1) Turn the set upside down
   2) Release the white catch and slide the locking piece as far to the side as possible.
   3) Slide the white collar as far to the side as possible.
   4) Slide the Pickup Roller as far as possible to the side, until it is free from the white collar on the other end.
   5) Rotate the Pickup Roller around the drive shaft until it can be removed.



b) In order to replace the MP Pickup Roller
   1) Release the white catch and slide the locking piece as far to the side as possible.
   2) Slide the white collar as far to the side as possible.
   3) Slide the Pickup Roller as far as possible to the side, until it is free from the white collar on the other end.
   4) Rotate the Pickup Roller around the drive shaft until it can be removed.



MEMO

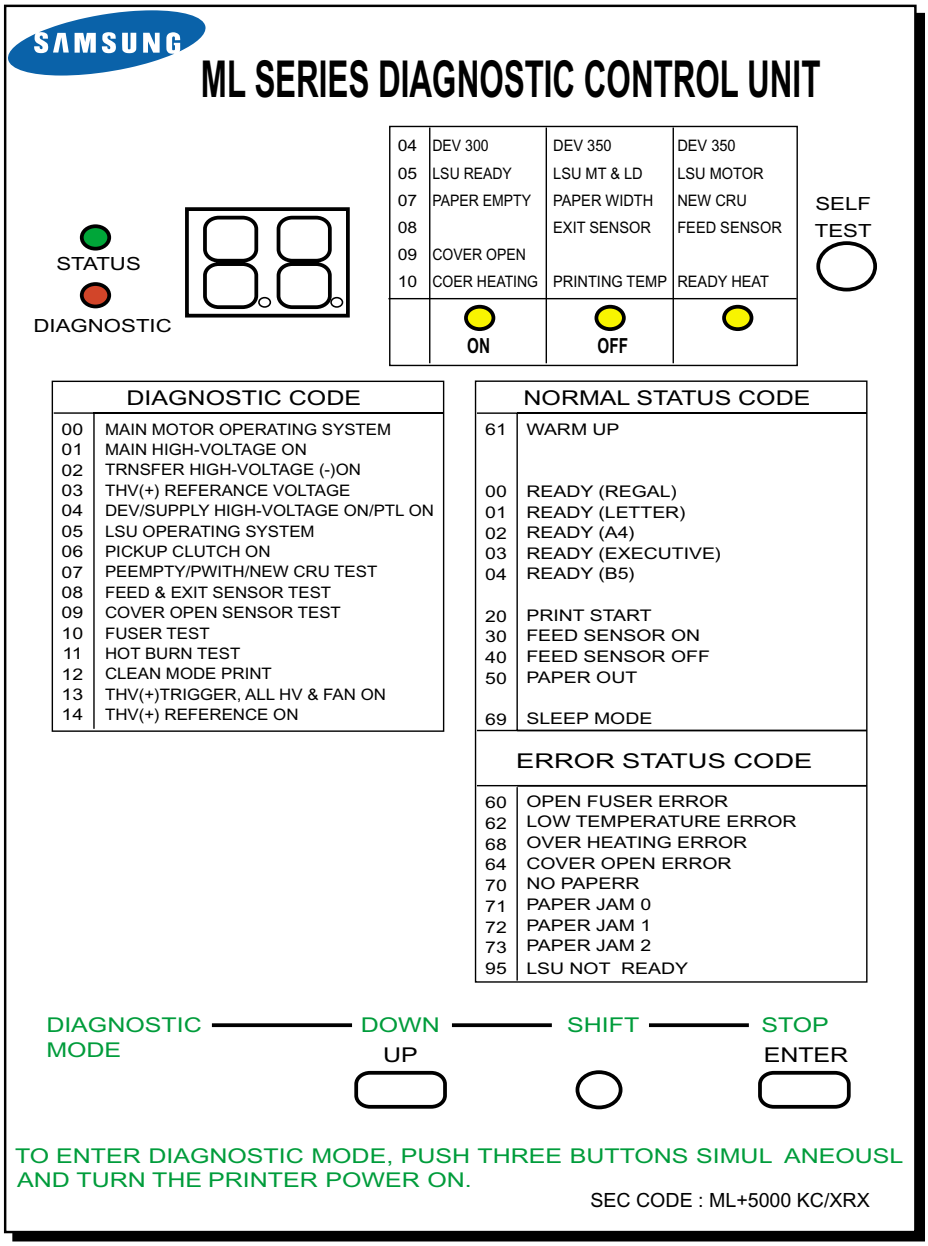
6. Alignment and Adjustments

This chapter describes some of the main service procedures including:
Using the DCU for diagnostics; Clearing paper jam and test patterns.
Much of this chapter is also included in the user's guide.

6.1 How to use DCU

6.1.1 DCU Setup

You can use the DCU test jig as an aid to the diagnosis of printer problems. To connect the DCU to the printer open the rear accessory cover (see page 5-9 step7) and then connect the DCU harness wire (10 pin/4 pin) to CN2(ML-2250) on the Main control board.



6.1.2 Code

The DCU can be used in 2 modes – Status Monitoring and Self Diagnostic.
To use the DCU in Status monitoring mode connect the DCU and turn the printer power on. The 7 segment LED display will show various codes that show the progress of the print operation.

1) Normal Code

When the printer is warming up or during a print job the display indicates the paper position.

Code	State	Description
78	System Initialisation	The main processor is starting up
61	Warming up	The printer is on, the cover is open or close.
00~05	Ready (exact code depends on paper size)	The printer is ready. The paper is detected when the first page is printed. 00: Legal, 01: Letter, 02: A4, 03: EXEC, 04: B5
20	Print Start	The engine controller received the print order from the video controller. 20: 1st, 21: MP, 22: SCF
30	Feed Sensor On	The paper is passing out of the Feed Sensor.
40	Feed Sensor off	The paper has passed out of the Feed Sensor.
50	Paper Out	The paper has passed out of Exit Sensor.
69	Sleep Mode	The fuser power is turned off to minimize the power consumption.

2) Error Code

If a problem is detected during the print process printing is stopped and an error code is displayed.

Code	State	Description
60, 62, 68	Fuser Error	An error has occurred in the fuser. See section 4.3.5.9. • 60: Open Fuser Error • 62: Low Heat Error • 68: Over Heat Error
64	Cover Open	The Printer Cover is open.
65	CRU Error	The Toner Cartridge is not installed,
70	No Paper	No paper in the paper cassette.
71	Paper Jam 0	The front part of paper is jammed between pickup unit and Feed sensor.
72	Paper Jam 1	The front part of paper is jammed between the Exit sensor and Feed sensor.
73	Paper Jam 2	The front part of paper is jammed just after passing through the Exit sensor.
95	LSU Not Ready	LSU Scanner Motor not ready or Hsync signal not output.

6.1.3 Self Diagnostic Mode

If Error code is displayed use the Self Diagnostic Mode to assist in solving the problem. Only use the Self Diagnostic mode for fault finding as many safety features are disabled.

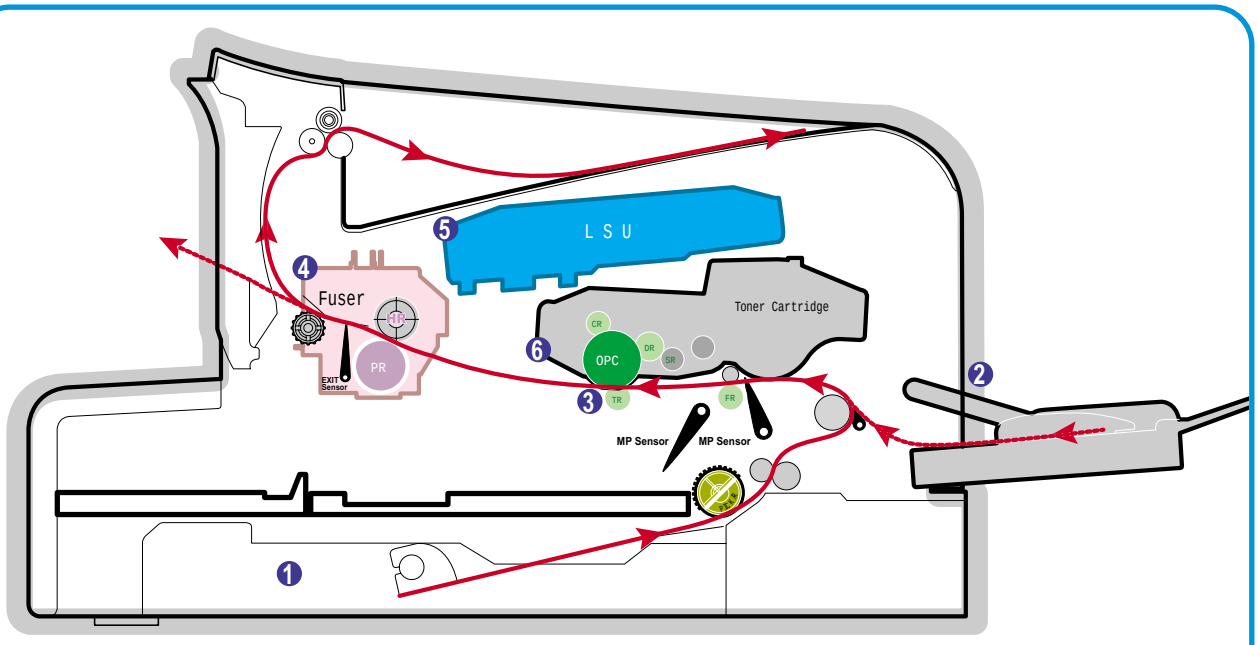
To enter the Self Diagnostic mode connect the DCU and hold down the [Down], [Shift] and [Stop] at the same time. Whilst holding these buttons turn the printer power on.
Code 78 will appear in the display. Continue to hold the buttons for approximately 3 seconds until 00 appears then release the buttons.
Use the [Up] or [Shift][Up] buttons to select the required test. To start the test press the [Enter] button. To stop the test press the [Shift] and [Enter] buttons together.

Code	Description
00	**Main Motor Operating System** The main motor is tested.
01	**Main High Voltage On (MHV-)** -1550 voltage output to MHV terminal. *Caution : High voltage probe should be used.*
02	**Transfer High Voltage (-) On (THV-)** -1200 voltage output by THV terminal. Caution : High voltage probe should be used.
03	**Transfer High Voltage (+) On (THV +)** +1300 voltage output to THV terminal. *Caution : High voltage probe should be used.*
04	**DEV/supply High Voltage** : DEV/Supply High Voltage Test. -430 voltage output to DEV terminal. *Caution : High voltage probe should be used.*
05	**LSU Operating System** The LSU scanning motor is started and the 'ON' LED is lit. When LSU motor is ready the 3 rd LED is lit.
06	**Pickup clutch on** The main cassette Solenoid is tested.

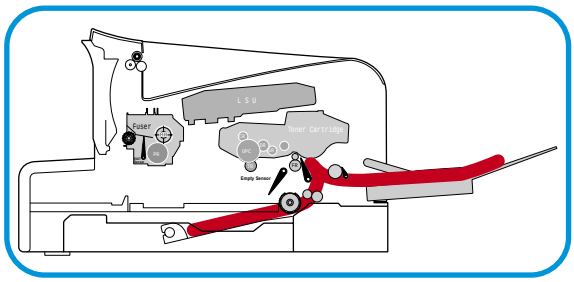
Code	Description
07	Paper Empty Sensor Test : The 'ON' LED indicates the status of the main cassette Paper Empty sensor.
08	Feed & Exit Sensor Test The 'OFF' LED indicates the status of the Exit sensor The 3 rd LED indicates the status of the Feed Sensor **Note** the Feed sensor also detects the presence of the toner cartridge
09	Cover Open Sensor Test The 'ON' LED indicates the status of the Cover Open sensor.
10	Fuser Test When {Enter] is pressed the Heat lamp is turned on. The 'ON' and 'OFF' LEDS indicate the lamp status
11	Hot Burn Test When the [Enter] button is pressed the printer continuously prints without detection. Turn the power off to stop this test.
12	Cleaning Mode Print Mode Causes the 'Cleaning' cycle to be repeated continuously Turn the power off to stop this test..
13	THV(+) TRIGGER. ALL HV : All high voltage are output to each HV terminal. TheLSU and the fan are started. In this Mode the electronic resistance of the transfer roller is detected and the THV is checked.
14	PTL Test : Tests the PTL lamp The 'ON' and 'OFF' LEDS indicate the lamp status.
15	Fan Test : Tests the Fan The 'ON' and 'OFF' LEDS indicate the fan status.
16	Regi Clutch Test : Tests the Registration Clutch. The 'ON' and 'OFF' LEDS indicate the clutch status.
17	Regi Senosr Test : Tests the Registration Sensor. The 'ON' LED indicates the sensor status.
18	MP Pickup Test : Tests the MP pickup clutch. The 'ON' and 'OFF' LEDS indicate the clutch status.
19	MP Sensor Test : Tests the MP Paper sensor The 'ON' LED indicates the sensor status.

No.	Function	Enter	LED	Stop	Remark
00	Motor	Motor Run		Motor Stop	
01	MHV	Mhv On		Mhv Off	-1550V
02	THV(-)	Thv Negative On		Thv Negative Off	
03	THV(+)	Thv On		Thv Off	+1300V
04	DEV	Dev On		Dev Off	+430V
05	LSU	LSU Run	● On ● Off ● Ready	LSU Stop	
06	PickUp	Pickup On		Pickup Off	
07	PEmpty		● Paper Empty ● ●		
08	Sensor		● ● Exit ● Feed		
09	Cover		● Cover Open ● ●		
10	Fuser	Fuser On		Fuser Off	160ßC
11	HotBurn	HotBurn On			
12	Clean Print	Clean Printing			
13	Thv Reference		● low ● adequate ● high		
14	PTL	PTL On		PTL Off	
15	FAN	Fan On		Fan Off	
16	Regi Clutch	Regi Clutch		Regi Clutch Off	
17	Regi Sensor		● Manual Sensor ● ●		
18	MP Pickup	MP Pickup On		MP Pickup Off	
19	MP Sensor		● MP Empty ● ●		

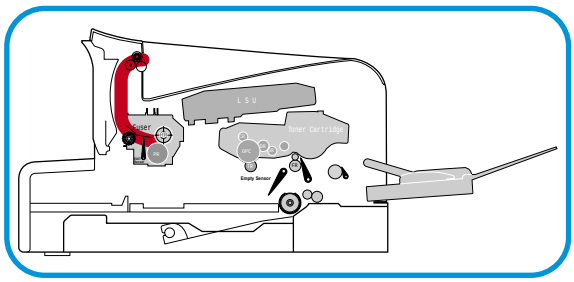
6.2 Paper Path



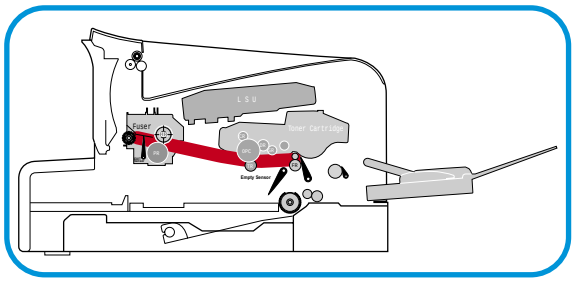
1. Cassette
2. Manual Feeder
3. Transfer Roller
4. Fuser
5. LSU(Laser Scan Unit)
6. Toner Cartridge



<Jam0>



<Jam2>



<Jam1>

1) After receiving the print command, the printer feeds paper from the main or optional second cassette or manual feeder as required.

2) The paper being fed passes the paper feed sensor. (Jam 0 occurs if the sensor is not operated within a certain time)

3) Having passed the paper feed sensor the paper moves to the paper exit sensor via printing process. (Jam 1 occurs if the sensor is not operated within a certain time)

4) The paper then passes through the paper exit sensor and out of the set. (Jam 2 occurs if the trailing edge of the paper does not pass the exit sensor within a certain time of the paper leading adge activating the exit sensor)

6.3 Clearing Paper Jams

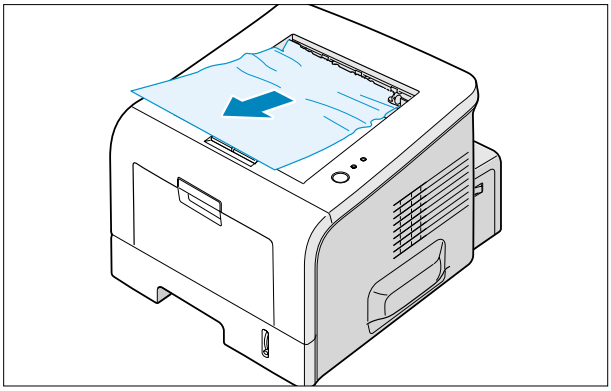
Occasionally, paper can be jammed during a print job. Some of causes include:

- The tray is loaded improperly or overfilled.
- The tray has been pulled out during a print job.
- The front cover has been opened during a print job.
- Paper that does not meet paper specifications has been used.
- Paper that is outside of the supported size range has been used.

If a paper jam occurs, the On Line/Error LED on the control panel lights red. Find and remove the jammed paper. If there is no paper visible look inside the printer.
Do not use tweezers or other sharp metal tools when removing a jam. You may damage the toner cartridge, fuser rollers or potentially damage wiring insulation leading to an electric shock..
Note If, when removing jammed paper, the paper tears ensure that **ALL** fragments of paper are removed from the printer otherwise a jam will re-occur.

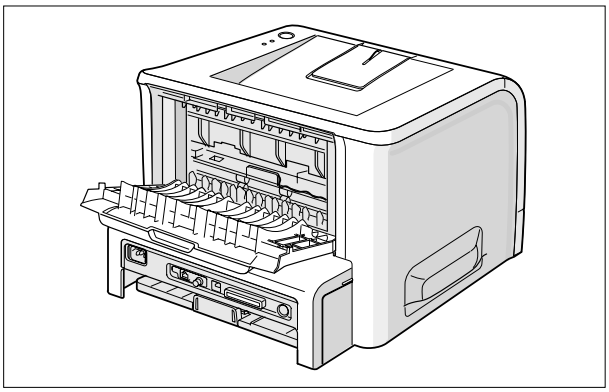
6.3.1 In the Paper Exit Area (JAM2)

1) If the paper jams as it exits to the output tray and a long portion of the paper is visible, pull the paper straight out.

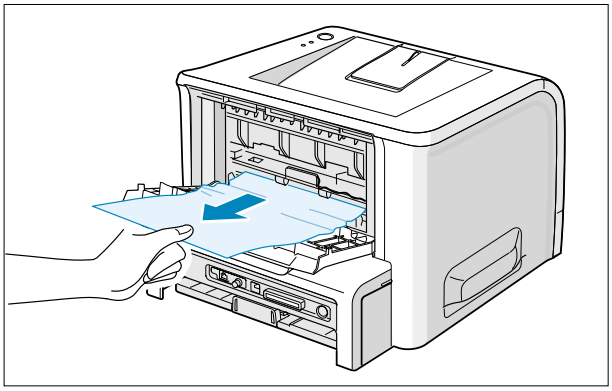


When you pull the jammed paper, if there is resistance and the paper does not move immediately, stop pulling. Continue with the next step.

2) Open the rear output tray.



3) Loosen the paper if it is caught in the feed rollers. Then pull the paper gently out.



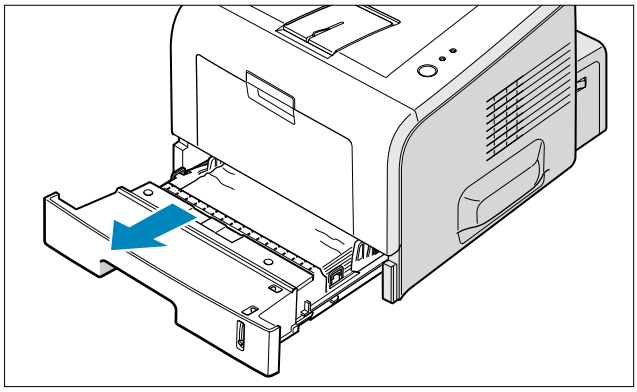
Note: Please be careful when you open the rear cover. The inside of the printer is still hot.

4) Close the rear output tray. Open and close the front cover. Printing can be resumed.

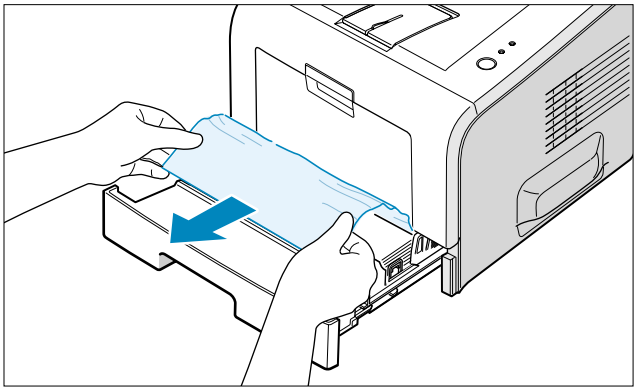
Caution: *paper jammed in this area is very close to the fuser. This can be extremely hot. Take care not to get burned.*

6.3.2 In the Paper Feed Area (JAM0)

1) Slide out the tray to expose the jammed paper.



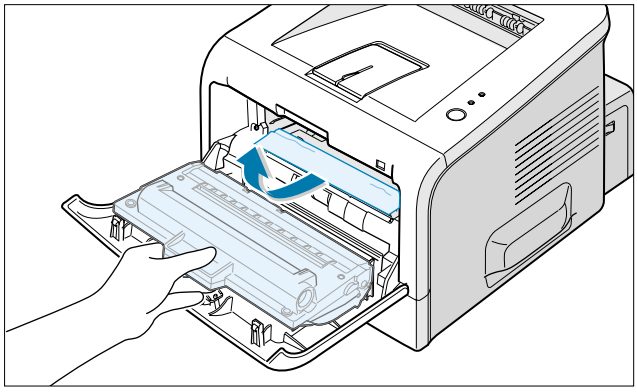
2) Remove any jammed paper by pulling it out by the visible edge from the tray. Make sure that all of the paper is properly aligned in the tray.



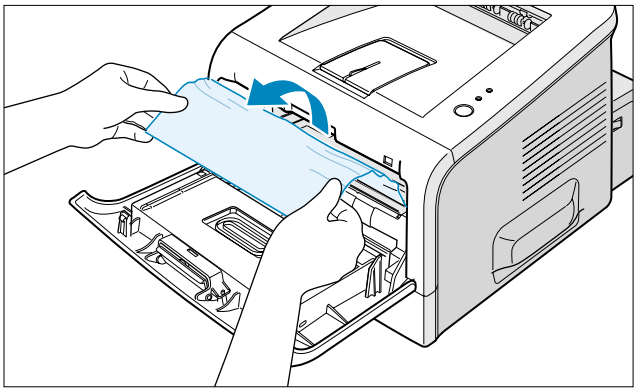
3) Slide the tray back into the printer. Open and close the front cover. Printing can be resumed.

6.3.3 Around the Toner Cartridge (JAM1)

1) Open the front cover and remove the toner cartridge



2) Gently pull the paper toward you.



3) Check that there is no other paper in the printer.

4) Reinstall the toner cartridge, and then close the cover. Printing can be resumed.

6.3.4 Tips for Avoiding Paper Jams

By selecting the correct paper types, most paper jams can be avoided. If a paper jam occurs, follow the steps outlined in

- Ensure that the adjustable guides are positioned correctly.
- Do not overload the tray. Ensure that the paper is below the paper capacity mark on the right inside of the tray.
- Do not remove the paper from the tray while printing.
- Flex, fan and straighten the paper before loading.
- Do not use creased, damp or highly curled paper.
- Do not mix paper types in the input tray.
- Use only recommended print media.
- Ensure that the recommended print side is facing down when loading paper into the input tray.

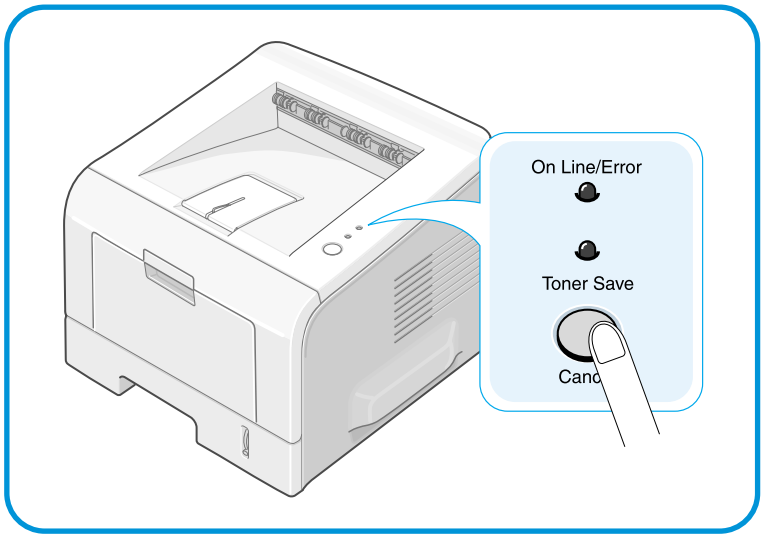
6.4 Sample Pattern

This product has the several sample patterns for maintenance. With the sample patterns, check the existence of the abnormality. The patterns help to regularly maintain the product.

6.4.1 Printing a Demo Page

Print a demo page or a configuration sheet to make sure that the printer is operating correctly.

1) Hold down the Cancel button for about 2 seconds to print a demo page.
   Hold down the Cancel button for about 6 seconds to print the printer configuration. For ML2250 only the et configuration is printed (1 page). For ML2251N and ML2252W. both the set and network configuration pages are printed



<Demo Page : ML-1710>

<Demo Page : ML-1750>

2) The Demo page or the configuration sheet shows the printer's current configuration.

SAMSUNG

ML-2250 Series

Monochrome Laser Printer

DigitAll**performance**

- Up to 22 ppm in Letter print speed(20 ppm in A4)
- True 1,200 x 1,200 dpi dffective output
- Powerful 166 MHz processor
- 16 MB Memory (upgradeable up to 144 MB)
- 250-sheet paper cassette tray

DigitAll**Value**

- One touch Toner Save Button - expand the life of the toner cartridge by 40%
- One touch Cancel Button

DigitAll**compatibility**

- Windows® 95/98/Me/NT 4.0/2000/XP
- Various Linux® OS including Red Hat, Caldera, Debian, Mandrake, Slackware, SuSE and Turbo Linux
- USB 2.0 (Compatible with USB 1.1), IEEE1284 parallel interface
- PCL6, IBM ProPrinter and EPSON emulations
- Optional PostScript3 emulation (ML-2250/2251N/2252W)
- Built-in 10/100 Base TX network (ML-2251N/2252W)
- Built-in 802.11b Wireless network (ML-2252W)

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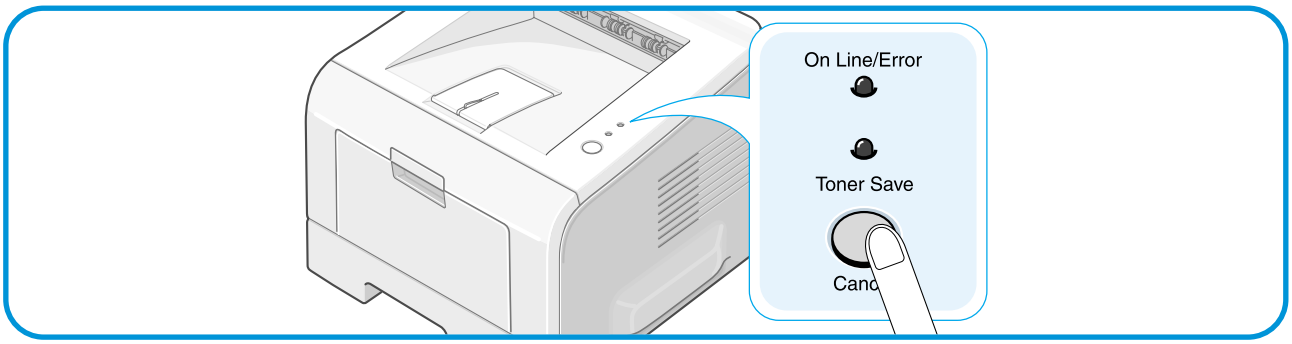
6.4.2 Printing a cleaning sheet

If you are experiencing blurred, faded or smeared printouts. Printing a cleaning sheet cleans the drum inside the toner cartridge. This process will produce a page with toner debris, which should be discarded.

1) Ensure that the printer is turned on and in the Ready mode with paper loaded in the tray.



2) Press and hold down the Cancel button on the control panel for about 10 seconds.

3) Your printer automatically picks up a sheet of paper from the tray and prints out a cleaning sheet with dust or toner particles on it.

Note: The cartridge cleaning process takes some time. To stop printing, turn the power off.

6.5 Consumables and Replacement Parts

The life cycle outlined below is a general guideline for maintenance purposes and is for reference only. Environmental conditions (temperature, humidity, dust etc.) and actual use can cause these figures to vary.

COMPONENT	REPLACEMENT CYCLE	
Transfer Roller	60,000 Pages	
Fuser	80,000 Pages	
Toner Cartridge	5,000 Pages	cartridge supplied with set
	5,000 Pages	replacement cartridge

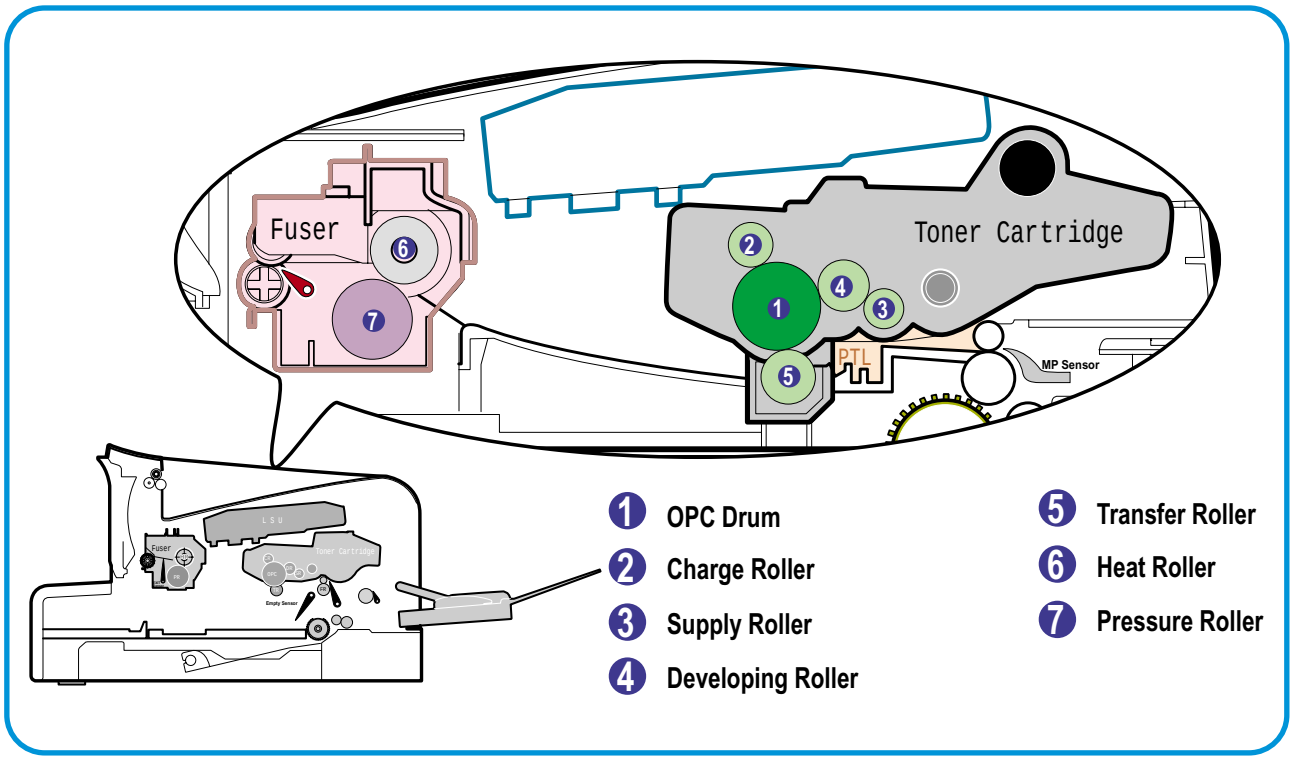
6.6 The LED Status Display by Each Error

ERROR	LED Status	DCU CODE
Open Fuser Error	The [Error] LED (red) and the [Toner Save] LED are simultaneously flashing at 1 second intervals.	60
Over Heat Error	The [Error] LED (orange) and the [Toner Save] LED are simultaneously flashing at 1 second intervals.	68
Low Heat Error	The [Error] LED (red) and the [Toner Save] LED are simultaneously flashing at 4 second intervals.	62
LSU not Ready Error (Pmotor Error)	The [Error] LED (green) and the [Toner Save] LED are simultaneously at 1 second intervals.	95
LSU Not Ready Error (HSYNC Error)	The printing is stop in the fad status, and the [Error] LED (green) and the [Toner Save] LED are simultaneously flashing at 4 second intervals.	96

6.7 Periodic Defective Image

If a mark or other printing defect occurs at regular intervals down the page it may be caused by a damaged or contaminated roller. Measure the repetition interval and refer to the table below to identify the roller concerned.

No	Roller	Defective image	Typical defect
1	OPC Drum	75.5mm	white spot on black image or black spot
2	Charge Roller	37.7mm	black spot
3	Supply Roller	44.9mm	light or dark horizontal image band
4	Developing Roller	35.3mm	horizontal image band
5	Transfer Roller	47.1mm	image ghost
6	Heat Roller	78mm	Black spot and image ghost
7	Pressure Roller	75.5mm	black spot on the backside



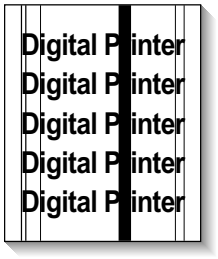
<Rollers Layout>

7. Troubleshooting

7.1 Bad image

7.1.1 Vertical Black Line and Band

• **Description** 1. Straight thin black vertical line occurs in the printing.
2. Dark black vertical band occur in the printing.



Check and Cause	Solution
1. Damaged developer roller, deformed Doctor-blade or cleaning-blade in the Toner cartridge.	1. Replace the toner cartridge and test again.
2. Scratched surface of the charge roller in the toner cartridge.	2. Replace the toner cartridge and test again.
3. 3. Depression or deformation of the surface of the transfer roller.	3. Replace the transfer roller and test again.

7.1.2 Vertical White Line

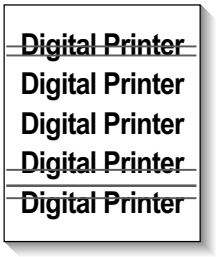
• **Description** White vertical voids in the image.

Check and Cause	Solution
1. 1. Contamination of the window or internal lenses of LSU mirror.	1. Clean the LSU window with recommended cleaner (IPA) Clean the window with a clean cotton swab. If dirt is inside the LSU – replace LSU.
2. Foreign object inside the toner cartridge or low toner.	2. Replace the toner cartridge.
3. Foreign object, contamination or burr on the edge of the toner cartridge window.	3. Clean the exposure window.
4. If the fuser is defective, voids occur periodically at the top of a black image.	4. Open the front cover and check the ribs that correspond to the position of the voids. Remove if found.
5. Contamination of the OPC drum.	5. If the problems are not solved, replace the toner cartridge.
6. Depression or deformation of the surface of the transfer roller	6. Replace the transfer roller.

7.1.3 Horizontal Black Band

• Description

1. Dark or blurry horizontal stripes occur in the printing periodically. (They may not occur periodically.)



Check and Cause	Solution
1. Bad contacts on the toner cartridge high voltage terminals.	1. Clean all HV terminals on the cartridge and on the set frame. Ensure all toner or paper dust particles are removed.
2. The rollers in the toner cartridge may be contaminated. Charge roller = 37.7mm Supply roller = 44.9mm Develop roller = 35.3mm Transfer roller = 47.1mm	2. Clean the right Gear that has relatively small tooth gap on the OPC.
	3. If the problem persists replace the toner cartridge.

7.1.4 Black/White Spot

• Description

1. Dark or blurry black spots occur periodically in the printing.
2. White spots occur periodically in the printing.

Check and Cause	Solution
1. If dark or blurry black spots occur periodically, the rollers in the Developer may be contaminated with foreign matter or paper particles. (Charge roller : 37.7 mm interval OPC drum : 75.5 mm interval)	1. Print several OPC cleaning Mode Prints and then run the Self-test 2 or 3 times.
2. If faded areas or voids occur in a black image at intervals of 75.5 mm, or black spots occur elsewhere, the OPC drum surface is damaged.	2. 75.5 mm repetition: Examine the surface of the OPC drum and carefully clean with a soft, lint free cloth. If unsuccessful replace the cartridge. 37.7mm repetition: Replace the toner cartridge
3. If a black image is partially broken, the transfer voltage is abnormal or the transfer roller's life has expired.	3. The transfer roller guarantees 60,000 sheets printing. If the roller's life is expired, replace it. **Note**. Cleaning the inside of the set to remove excess toner particles or paper dust will reduce the occurrence of this problem..

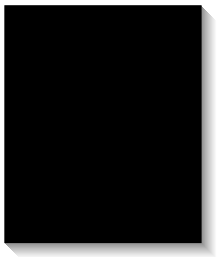
7.1.5 Light Image

• **Description** The printed image is light, with no ghost.

Check and Cause	Solution
1. Toner Save mode enabled	1. Ensure the Toner Save mode is off. Check set and driver settings.
2. Develop roller is contaminated or the toner cartridge is almost empty.	2. Replace the toner cartridge and try to print out again.
3. Ambient temperature is below than 10°C.	3. Wait 30 minutes after printer is powered on before you start printing.
4. Bad contact caused by dirty terminals on the toner cartridge or set.	4. Clean the cartridge and set contacts. Generally clean dirt from inside the set.
5. Abnormal output from the HVPS.	5. Replace the HVPS if the problems are not solved by the above four instructions.

7.1.6 Dark Image or a Black

• **Description** The printed image is dark.



Check and Cause	Solution
1. No charge voltage in the engine board.	1. Check the state of the connector which connects the engine board and HVPS.
2. Charge voltage fault due to bad contact between toner cartridge and set contacts.	2. Clean the high voltage charge terminals. **Note** if 1 and 2 do not resolve the problem and the problem persists replace the HVPS.
3. VD0 signal of the Main PBA is Low state.	3. Replace the LSU Unit or Main PBA.

7.1.7 Uneven Density

• **Description** Print density is uneven between left and right.

Digital Printer
Digital Printer
Digital Printer
Digital Printer
Digital Printer

Check and Cause	Solution
1. The pressure force on the left and right springs of the transfer roller is not even, the springs are damaged, the transfer roller is improperly installed, or the transfer roller bushing or holders are damaged.	1. Replace both the left and right bush and spring assemblies.
2. The life of the Toner cartridge has expired.	2. Replace the toner cartridge and try to print out
3. The toner level is not even on the toner cartridge roller due to the damaged blade or low toner.	3. Gently shake the toner cartridge and try printing again. If the problem persists replace the toner cartridge.

7.1.8 Background

• **Description** Light dark background appears in whole area of the printing.

Digital Printer
Digital Printer
Digital Printer
Digital Printer
Digital Printer

Check and Cause	Solution
1. Printing large quantities of low coverage (2%) pages or the printer has not been used for a long time.	1. The toner cartridge is basically designed to print 5,000 sheets with 5% image. If it prints more than 5,000 sheets with 2% coverage, a background can occur.
2. Is recycled paper being used?	2. The B/S is not guaranteed if using recycled paper. **Note** try shaking the toner cartridge gently from side to side. If the problem persists replace the toner cartridge.
3. Has the life span of the toner cartridge ended?	3. Replace the toner cartridge when its life is expired.
4. Is the movement(Up and Down) of the transfer roller smooth?	4. Clean the transfer roller bushes.
5. Is the HVPS normal?	5. Clean the high voltage charge terminals. If this does not resolve the problem replace the HVPS.

7.1.9 Ghost (1)

• **Description** Ghost occurs at 75.5 mm intervals of the OPC drum in the whole printing.

Check and Cause	Solution
1. Bad contacts caused by contamination from toner particles between high voltage terminal in the main body and the electrode of the Toner cartridge.	1 and 2. Clean all HV contacts, If problem persists replace the HVPS. If problem still persists replace the Main PBA
2. Bad contacts caused by contamination from toner particles between high voltage terminal in the main body and the one in the HVPS board.	
3. The life of toner cartridge is expired.	3. Replace the toner cartridge and try to print out.
4. Transfer roller life (60,000 sheets) has expired.	4. Check the transfer roller lifetime and replace it.
5. Low ambient temperature (below 10°C).	5. Wait about 30 minutes after power on before using printer.
6. Damaged cleaning blade in the toner cartridge.	6. Replace the toner cartridge and try to print out again

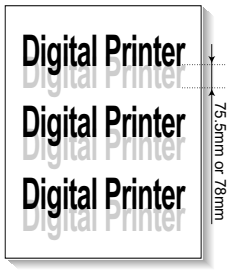
7.1.10 Ghost (2)

• **Description** Ghost occurs at 75.5 mm intervals of the OPC drum in the whole printing.
(When printing on card stock or transparencies using manual feeder)

Check and Cause	Solution
When printing on card stock, thicker than normal paper or transparencies, such as OHP, a higher transfer voltage is required.	Ensure that the correct paper type is selected in the printer driver or application software. Remember to set back to normal paper after use.

7.1.11 Ghost (3)

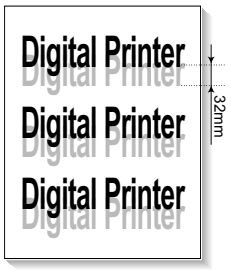
• **Description** Ghost occurs at 75.5mm or 78mm intervals.



Check and Cause	Solution
Fuser contamination or temperature control problem.	1. Disassemble the fuser and remove any contamination on the rollers. Clean any contamination from between the Thermistor and the Heat roller. (Caution: Take care not to deform the rollers.)

7.1.12 Ghost (4)

• **Description** A White ghost occurs in a black image printing at 32 mm intervals.



Check and Cause	Solution
1. The life of the developer may be expired.	1. Problem in the toner cartridge, replace the toner cartridge and try to print out again.
2. Abnormal output from the HVPS.	2. Check the HVPS supply voltage. Clean all HV terminals on the cartridge and on the set. Replace the HVPS if the problem persists.

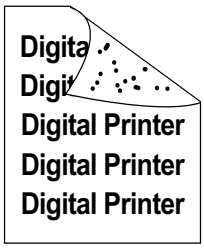
7.1.13 Stains on the Face of Page

• **Description** The background on the face of the printed page is stained.

Check and Cause	Solution
1. Toner leakage due to improperly sealed developer.	1. Replace the developer cartridge.
2. If the charge roller is contaminated, stains on the face of page will occur.	2. If the charge roller is contaminated, run PC Cleaning Mode Print 2 or 3 times. And perform Self-Test 2 or 3 times to remove contamination.

7.1.14 Stains on Back of Page

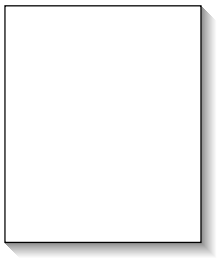
• **Description** The back of the page is stained at 47 mm intervals.



Check and Cause	Solution
1. Transfer roller is contaminated.	1. Perform the OPC Cleaning Mode Print 2 or 3 times. Run Self-Test to remove the contamination from the transfer roller.
2. Pressure roller is contaminated.	Note. Replace the transfer roller if contaminated severely. 2. Disassemble the fuser and clean the H/R(Heat Roller) and P/R(Pressure roller). Check and clean the area between the H/R and the Thermistor. (Caution: Take care not to deform the rollers.)

7.1.15 Blank Page Print out (1)

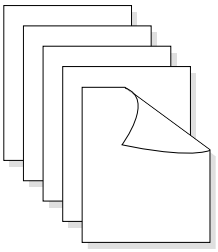
• **Description** Blank page is printed.



Check and Cause	Solution
Bad ground contacts in OPC and/or toner cartridge.	1. Check if the Ground-OPC or the OPC Ground Zener diode are defective or open circuit. (set inside left side). 2. Remove contamination of the terminals on the toner cartridge and the unit.

7.1.16 Blank Page Print out (2)

• **Description**
1. Blank page is printed.
2. One or several blank pages are printed.
3. When the printer turns on, several blank pages print.



Check and Cause	Solution
1. Bad ground contacts in OPC and/or toner cartridge.	Try turning the power off, deleting any print jobs in the PC print queue and then try printing again.
2. Abnormal solenoid.	1. See 7.1.15 above 2. Perform the engine self test using DCU (refer to code 6) to check if the Solenoid is normal. If the problem persists replace the engine PBA

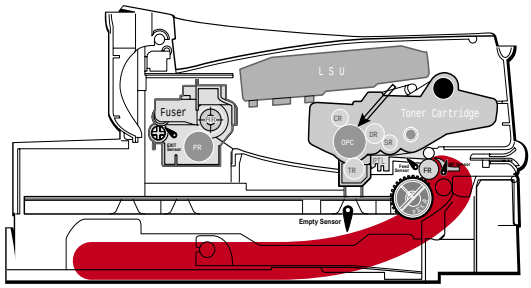
7.2 Paper Feed problems - Causes and Solutions

7.2.1 Wrong Print Position

• **Description** Printing begins at wrong position on the paper.

Check and Cause	Solution
Wrong sense time caused by defective feed sensor actuator.	Replace the defective actuator

7.2.2 JAM 0

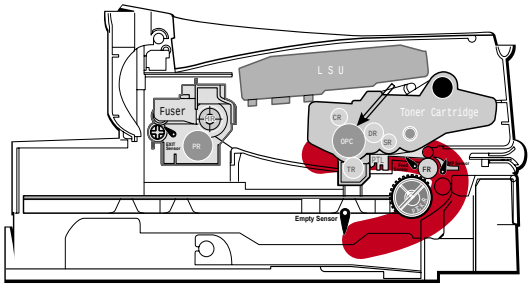


• **Description**

1. Paper is not exited from the cassette.
2. Jam-0 occurs if the paper is not ted into the printer.

Check and Cause	Solution
1. Check the Solenoid by using DCU Diagnostic Mode 06.	1. Replace the solenoid.
2. Check cassette/MP knock-up plate and springs.	2. Repair / replace as required
3. Check paper separator pad	3 Clean with soft cloth dampened with IPA (Isopropyl Alcohol) or water. Replace if required.
4. Check the pick up roller for contamination and correct assembly.	4. Clean with soft cloth dampened with IPA (Isopropyl Alcohol) or water. Replace if required
5. If continuous clusters occur, check all rollers between pickup and registration sensor.	5. Ensure all rollers are clean and free to operate correctly.
6. If the paper feeds into the printer and Jam 0 occurs, use DCU to check feed sensor.	6. Check the SMPS PBA, Main PBA and all connections. Replace any faulty parts or the

7.2.3 JAM 1

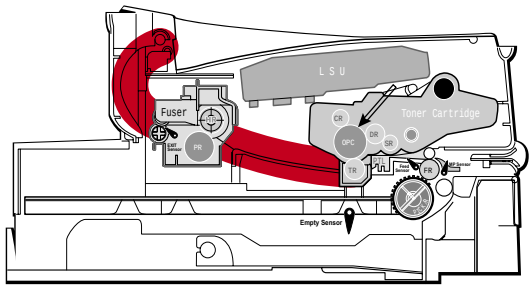


• Description

1. Recording paper is jammed in front of or inside the fuser.
2. Recording paper is stuck in the discharge roller and in the fuser just after passing through the Actuator-Feed.

Check and Cause	Solution
1. If the recording paper is jammed in front of or inside the fuser.	1. Replace the Exit-Sensor, SMPS or main PBA.
2. If the recording paper is stuck in the discharge roller and the fuser just after passing through the Actuator-Feed, Feed Actuator may be defective.	2. Reassemble the Actuator-Feed and Spring-Actuator if the movement is bad. Replace if necessary.

7.2.4 JAM 2



• Description

1. Recording paper is jammed in front of or inside the fuser.
2. Recording paper is stuck in the discharge roller and in the fuser just after passing through the Actuator-Feed.

Check and Cause	Solution
1. If the paper is completely fed out of the printer, but Jam 2 occurs : Exit sensor is defective. • After the paper is completely discharged the Exit sensor actuator should return to its original position to shut the photo-sensor. It may stick open or return only slowly due to contamination be paper debris or foreign objects.	1. Check if the exit sensor actuator is defective. • Check if the actuator exit is deformed (Check if the lever part is deformed). • Check whether burrs occur in the assembly part of the exit actuator and if the actuator operates smoothly. • Check if foreign objects or paper debris are preventing the correct operation of the actuator.
2. If the paper is rolled in the Fuser Roller(accordion Jam): • This occurs when a Guide claw is broken away, damaged or deformed. • It occurs when the Spring of a Guide claw is broken or damaged. • It occurs when the Heat-Roller or Pressure-Roller is seriously contaminated with toner.	2. If the paper is stuck in the fuser : disassemble the fuser and remove the jammed paper, and clean the surface of the pressure roller with dry gauze. Check all ribs, claws and springs.

7.2.5 Multi-Feeding

• **Description** Multiple sheets of paper are fed at once.

Check and Cause	Solution
1. Check that the paper size guides are set correctly (cassette and MPF tray).	1. Adjust paper guides.
2. Solenoid malfunction (the solenoid does not work properly). Perform DCU diagnostic Code 06	2. Replace the solenoids or PBA as appropriate.
3. Friction Pad is contaminated.	3. Clean the friction pad rubber with a soft cloth dampened with IPA (Isopropyl Alcohol) or water.
4. Paper has a rough surface texture.	4. Use paper with a smother surface finish.

7.2.6 Paper rolled in the Fuser

• **Description** Paper rolled around fuser rollers or 'Accordion' jam

Check and Cause	Solution
1. Contamination of the pressure roller or heat roller.	1. After disassembling the fuser, clean contamination from between the heat roller and the thermistor and also clean contamination from the pressure roller. Clean the surface of the rollers with IPA or water
2. Damaged or deformed ribs, claws or springs.	2. Check for damage or deformation of the print claws and the holder plate claws, and repair or replace as appropriate.

7.2.7 Paper rolled on the OPC Drum

• **Description** Paper is rolled up in the OPC.

Check and Cause	Solution
1. Paper is too thin. 2. The face of paper is curled.	1. Use paper that conforms to the printer specification. 2. Ensure paper is stored properly to prevent curl. **Note.** To remove paper rolled in the OPC. • Remove the toner cartridge from the set, taking care not to touch the green surface. Use the gearwheel at the side to rotate the OPC drum and pull the paper from the cassette. • Clean fingerprints on the OPC gently with soft tissue, taking care not to scratch the surface.

7.3 Printer Faults – Causes and Solutions

7.3.1 All LEDs blinking (Fuser Error)

• **Description**	1. All the lamps on the operator panel blink. 2. The fuser drive gear breaks or melts. 3. When printing the motor skips or makes a noise due to a defective fuser drive gear

Check and Cause	Solution
Use EDC diagnostic code 10 to test the fuser. 1. Thermostat, fuser power cable or heat lamp is open circuit. 2. Thermistor is faulty. 3. Drive gear melted.	1. Replace heat lamp or cable harness if necessary. Replace the whole fuser assembly if the thermostat is open circuit. 2. Carefully inspect the thermistor mounting. If the mounting or the roller in this area is melted replace the whole fuser assembly. If the thermistor is faulty but there is no sign of heat damage replace the thermistor sensor. 3. Replace the fuser.

7.3.2 All LEDs blinking (Scan Error)

• **Description**	All lamps on the OPE panel blink.

Check and Cause	Solution
Use EDC diagnostic code 05 to test the LSU. 1. LSU cable or connector faulty. 2. LSU motor is faulty. 3. Check the HSYNC signal.	Replace the LSU or cable harness as required. Replace a main board if the same error persists after replacing the LSU.

7.3.3 Fuser gear melts due to overheating causing Paper Jam.

• Description	Constant Jam where paper is entering Fuser unit. Fuser rollers do not turn

Check and Cause	Solution
1. Check the Heat Lamp, thermostat and thermistor. Use the DCU Diagnostic Test 10 Error codes: '60', '62', '68'.	1. Replace Fuser unit 2. Replace the Main PBA as appropriate.

7.3.4 Paper Empty

• Description	The Paper Empty lamp is lit even when paper is loaded in the cassette.

Check and Cause	Solution
1. Deformed paper sensor actuator or faulty sensor. 2. Main PBA is defective. Use DCU Diagnostic Test 08. 3. Faulty cables or connectors.	1. Replace the defective actuator or sensor. 2. Replace the MAIN PBA as appropriate.

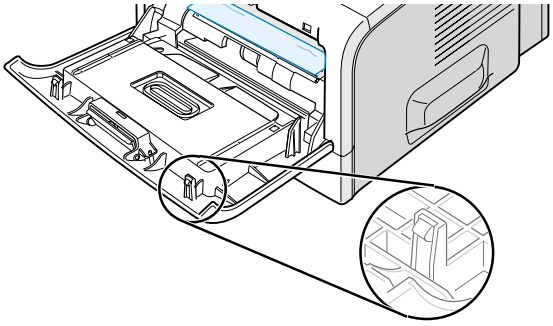
7.3.5 Paper Empty without indication

• **Description** The paper empty lamp does not light when the paper cassette is empty.

Check and Cause	Solution
1. Deformed paper sensor actuator or faulty sensor.	1. Replace the defective actuator.
2. Main PBA is defective. Use EDC diagnostic test 08.	2. Replace the MAIN PBA as appropriate
3. Faulty cables, connector or faulty Lamp	3. Check and replace cable harness or OPC as appropriate.

7.3.6 Cover Open

• **Description** The ERROR lamp is lit even when the print cover is closed.

Check and Cause	Solution
1. The 'Hook Lever' actuator may be stuck or faulty	1. Use EDC mode to check cover switch operation. Check and replace the actuator if necessary.
2. The 'hook Lever' tab on the front cover may be damaged or broken	2. Replace the front cover.
3. The sensor Switch on the main PBA may be defective.	3. Replace the Main PBA as necessary.
	

7.3.7 No ERROR lamp when the cover is open

• **Description** The ERROR lamp does not light even when the print cover is open.

Check and Cause	Solution
Use EDC diagnostic code 09, Check for error code '64'. 1. The 'Hook Lever' actuator may be stuck or faulty	1. Use EDC mode to check cover switch operation. Check and replace the actuator if necessary.
2. The OPE LED may be faulty. Check the connector and cables between the main PBA and the OPE panel	2. Replace the cable or OPE Panel as necessary.
3. The sensor switch on the main PBA may be faulty	3. Replace the main PBA if necessary.

7.3.8 Defective motor operation

• **Description** Main motor is faulty and paper does not feed into the printer, resulting in Jam 0'

Check and Cause	Solution
Perform EDC diagnostic code 00 to test the main motor. 1. The main motor harness or Motor PCB may be faulty. 2. The main PBA may be faulty 3. SMPS may be faulty	1. Check the motor harnesses and connectors, replace if defective.. 2. If the problem persists check and replace the main PBA or SMPS as appropriate. .

7.3.9 No Power

• **Description** When system power is turned the lamps on the OPE panel do not come on.

Check and Cause	Solution
1. Check if the power input and SMPS output are normal. 2. Lamps do not come on but normal start up sounds are heard. 3. After replacing SMPS lamps do not come on and no start up sounds are heard.	1. Replace the power supply cord or SMPS. Check power fuse and SMPS fuses replace if necessary. 2. Check OPE connector and harness. Replace the OPE panel or cable. 3. Replace the main PBA panel.

7.3.10 Printed Vertical Lines become curved

• **Description** When printing, vertical lines are not straight.

Check and Cause	Solution
Use EDC diagnostic code 05 to test the LSU motor. 1. Check stability of 24V supply to LSU.	1. 24V stable - Replace LSU. 24V unstable replace SMPS, if the problem persists replace the main PBA.

7.4 Toner Cartridge Service

It is not guaranteed for the default caused by using other toner cartridge other than the cartridge supplied by the Samsung Electronic or caused by non-licensed refill production.

7.4.1 Precautions on Safe-keeping of Toner Cartridge

Excessive exposure to direct light more than a few minutes may cause damage to the cartridge.

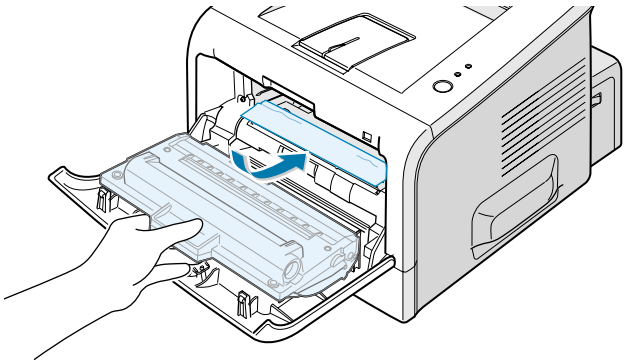
7.4.2 Service for the Life of Toner Cartridge

If the printed image is light due to the life of the toner, you can temporarily improve the print quality by redistributing the toner(Shake the toner cartridge), however, you should replace the toner cartridge to solve the problem thoroughly.

7.4.3 Redistributing Toner

When toner is low, faded or light areas may appear on a printed page. You may be able to temporarily improve the print quality by redistributing the toner. The following procedures may allow you to finish the current print job before replacing the toner cartridge.

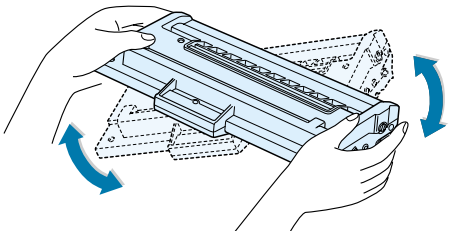
1) Grasp the front cover and pull it toward you to open.
2) Remove the toner cartridge from the printer



Note :

Avoid reaching too far into the printer. The fusing area may be hot.
To prevent damage to the toner cartridge, do not expose it to light for more than a few minutes.

3) Gently shake the toner cartridge from side to side five or six times to redistribute the toner.

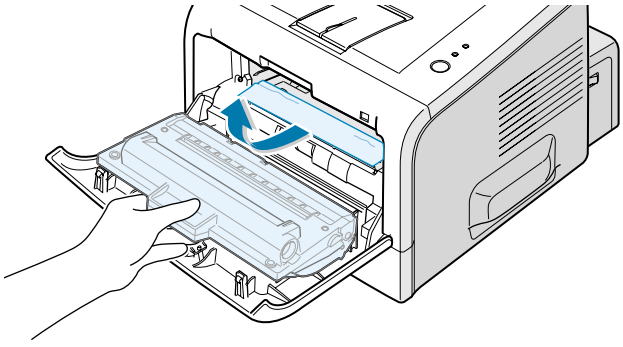


Note :

If the toner gets on your clothing, wipe it off with a dry cloth and wash clothing in cold water. Hot water sets toner into fabric.

4) Reinsert the toner cartridge into the printer. Ensure that the toner cartridge snaps into place.

5) Close the front cover. Make sure that the cover is securely closed.



7.4.4 Signs and Measures at Poor toner cartridge

Fault	Signs	Cause & Check	Solution
Light image and partially blank image (Cartridge life is ended.) 	• The printed image is light or dirty and untidy. • Parts of the image are not printed. • Periodically a "tick tick" noise occurs.	1. If the image is light or dirty and untidy - Shake the toner cartridge and then recheck. OK: Lack of toner, so the life is nearly expired. 2. Some part of image is not printed - Shake the toner cartridge and then recheck. (1)NG: clean the LSU window with a cotton swab, then recheck. (2)OK: Lack of toner, so the life is nearly closed. 3. Periodically a noise like "tick tick" occurs - Measure the time between ticks. 4. White vertical stripes on the whole or part of the page : Shake the toner cartridge and then recheck. OK: Lack of toner, so the life is nearly expired	1. All of 1, 2, 3 If image quality improves by shaking, replace with a new toner cartridge. Perhaps up to 100 pages left before out of toner. 2. For item 2- If image quality improves after cleaning the LSU window then the toner cartridge is normal. (Contamination on the LSU window has caused image quality problems.) 3. For item 3- If the time between ticks is about 2 seconds, the toner inside the toner cartridge is almost exhausted. (Purchase and replace with a new toner cartridge. Perhaps up to 200 pages left before out of toner) 4. For item 3- This is a phenomenon caused by lack of toner, so replace the toner cartridge.
Toner Contamination	• Toner contamination of the printed page at regular intervals down the page. • Random Toner contamination over the whole or large parts of the paper surface.	1. Contamination at regular intervals. (a)Check the distance between contamination marks. (b)Check the appearance of both ends of the toner cartridge OPC drum. 2. Random page contamination. (a) Check that the terminals (contact points) of the toner cartridge and the set are clean. (b) Check that the terminals (contact points) of the toner cartridge and the set are not damaged.	1.(a) Refer to section 6.5 1.(b) If both ends of the OPC drum are contaminated with toner: Check no. of pages printed using this cartridge – perhaps waste toner collector is full. 2. Clean all HV contacts. If the problem persists replace the cartridge.

Fault	Signs	Cause & Check	Solution
White Black spot 	• Light or dark black dots on the image occur periodically. • White spots occur in the image periodically.	1. If light or dark black dots occur at regular intervals this is because the toner cartridge rollers are contaminated with foreign substance or paper particles. (1)38mm interval : Charge roller (2)95mm interval : OPC cycle 2. If white spots occur in a black image at intervals of 95mm, or black spots occur elsewhere, the OPC drum is damaged or foreign substance is stuck to the surface. 3. If a black and white or graphic image is partially broken at irregular intervals, the transfer roller's life has been expired or the transfer voltage is abnormal.	1. For item 1 - Run OPC Cleaning Mode Print 4-5 times repeatedly to remove excess toner. Especially check for foreign substances on the OPC surface Clean with a clean gauze moistened with IPA Isopropyl Alcohol) take care not to damage the OPC surface. ⚠ Never use other forms of alcohol. 2. For Item 2 - If running OPC Cleaning Mode Print 4-5 times does not resolve the problem : at intervals of 37.7mm - place the toner cartridge. : at intervals of 75.5mm – clean OPC drum. 3. For item 3 - Change the transfer roller because the life of the transfer roller has expired. (Check the transfer voltage and readjust if necessary.)
Recycled product	• Poor appearance of the toner cartridge. • Dirty or rough printouts. • Bad background in the image.	1. Poor appearance of the toner cartridge. (a)Check for damage to label and if different materials are used. (b)Check the appearance of parts of the toner cartridge, such as frame, hopper, screws 2. Unclean and rough printouts. (a)Check that the terminals (contact point) of the toner cartridge and the set are clean. (b)Check that the terminals (contact point) of the toner cartridge and the set are not damaged.	1. For Item 1 the cartridge is judged to be a recycled product - (a) If there is any evidence of disassembling the toner cartridge. (b) If materials other than normal parts of the toner cartridge are added or substituted. 2. Clean all HV contacts. If the problem persists replace the cartridge. **Note** If the cartridge is judged to be recycled then these types of problems can occur when the toner cartridge is recycled over 2 times. If 'nearly empty' cartridges are collected for re-use this is judged as recycling the toner cartridge.

Fault	Signs	Cause & Check	Solution
Ghost & Image Contamination	• The printed image is too light or dark, or partially contaminated black. • Totally contaminated black. (Black image printed out) • The density of printouts is too dark and ghost occurs.	1. The printed image is too light or dark, or partially contaminated black. (a) Check if foreign substance or toner are stuck to the terminals (point of contact) of the toner cartridge or set. (b) Check if the terminal assembly is normal. 2. Totally contaminated black. (Black image printed out) (a) Check if foreign substances are stuck to the terminal (point of contact) of the toner cartridge or set. (b) Check if the terminal assembly is normal. (Especially check the charge roller terminal.) 3. The printed image is dark and ghost occurs. (a) Check if foreign substances are stuck to the terminal (point of contact) of the toner cartridge or set. (b) Check if the terminal assembly is normal. (Especially check the developer roller terminal.)	1. All of Items 1, 2, 3 (a) Clean the contacts on the toner cartridge. (b) Clean the contact points on the set. (c) If the terminal assembly is damaged repair or replace the terminals in the set or replace the cartridge 2. In Item 2 This is particularly related to problems with the charge roller contact. Pay close attention to the charge roller contacts. 3. In Item 3 This is particularly related to problems with the developer bias voltage contact. Pay close attention to the charge roller contacts.

7.5 Software Problems – Causes and Solutions

7.5.1 The printer is not working (1)

• **Description** While Power turned on, the printer is not working in the printing mode.

Check and Cause	Solution
1. Print a Demo Page: When the Ready lamp is lit press and hold the Cancel button until the lamps flash. Release the button.	1. If the test print works that means there are no problems in the printer itself. If the test printing does not work that means the printer is faulty and the problem is not due to computer software or driver settings.
2. Check that the PC and the printer are properly connected and that the toner cartridge installed correctly.	2. Replace the printer cable. If the problem is not solved even after the cable is replaced, check the amount of the remaining toner.
3. Printing is not working in the Windows.	3. Check that the connection between PC and printer port are correcct. If you use windows, check that the printer driver in the controller is set up correctly set up, the correct port is selected and 'Use On-line' is selected in the driver. If the printer driver is properly set up try printing a test page from the driver properties. Check in which program printing is not working. Try opening 'Memo Pad' and printing. If the printer is not working in a certain program, adjust the setup within that program. Sometimes, the printout is normal within the Windows basic programs, but it's not working in a particular program. In this case, uninstall and re-install the new driver. If the printer is not working in the Windows basic programs and you are printing using the parallel port check the port setting in CMOS is on ECP and that the address is IRQ 7 and 378 (for parallel port 1). Try using USB instead of parallel – or vice versa.
4. Check that the printer cable is directly connected to the printer.	4. If you have other devices that need to share the printer port try temporarily disconnecting these devices 9and perhaps even uninstalling their drivers) to ensure the printer works by itself. If you are using a USB hub try connecting directly to the back of the PC instead.

7.5.2 The printer is not working (2)

• Description After receiving the print command there is no response at all or print speed is low due to wrong setup of the environment rather than malfunction of the printer itself.

Check and Cause	Solution
1. Ensure you have sufficient free hard disk space for the temporary work files created during printing.	1. Not working with the message 'insufficient printer memory' means there is a hard disk space problem rather than a printer RAM problem. In this case provide more space on the hard disk. Secure more space using the disk utilities program.
2. Printing error occurs even if there is enough space in the hard disk.	2. The connection of the cable and printer port is not correct. Check that the cable is properly connected and if you are using the parallel port check that the port settings in CMOS is correct.
3. Check the parallel-port-related items in the CMOS Setup.	3. For the printer port, Select ECP. SPP and normal normal modes support 8-bit data transfer, while ECP Mode supports 12-bit data transfer.
4. Reboot the system to print.	4. If the regular font is not printing, the cable or the printer driver may be defective. Turn the PC and printer off, and reboot the system to print again. If not solved, double-click the printer in my computer If the regular fonts are not printed this time again. the cable must be defective so replace the cable with new one.

7.5.3 Abnormal Printing

• **Description**	Printing does not work – even after replacing the cable Printer does not work at all or strange fonts are printed,

Check and Cause	Solution
1. Set up the parallel port using CMOS SETUP.	1. Ensure that ECP (best) or SPP is selected in the CMOS (BIOS) setup.
2. Printer Driver Error.	2. Ensure that the correct driver is loaded. Use the driver supplied on the CD or downloaded from the Samsung web site. DO NOT use the Microsoft driver supplied with the Windows operating system. If the printer is a GDI or SPL type printer ensure that ALL OTHER GDI or SPL drivers are uninstalled as Windows allows only 1 of this type of driver to be loaded.
3. Error message “insufficient memory”. (The printing job sometimes stops due to insufficient virtual memory, this is caused by insufficient space on the hard disk.)	3. Delete any unnecessary files to secure enough space on the hard disk and start the print job again.

7.5.4 SPOOL Error

• **Description**	SPOOL (simultaneous peripheral operations online) is the process Windows uses to manage print jobs. Jobs are processed and then stored on the hard disk until the printer is ready to accept them

Check and Cause	Solution
1. Insufficient space on the hard disk in the directory assigned for the basic spool.	1. Delete any unnecessary files to provide more space for spool storage.
2. If previous printing errors were not solved.	2. There may be files from previous failed print jobs on the hard disk with the name in the form '*.jnl'. Delete these files and Reboot Windows to restart the printer.
3. There may be conflict with other drivers or programs.	3. Shut down all other programs except the current one, if possible.
4. When an application program or the printer driver is damaged.	4. Delete the printer driver completely and reinstall it.
5. When some files related to the OS are damaged or virus infected.	5 After rebooting the computer, check for viruses, restore the damaged files and reinstall the application program which is not working properly.
6. Memory is less than suggested.	6. Add up more memory to the PC.

⚠ How to delete the data in the spool manager.

In the spool manager, the installed drivers and the list of the documents waiting to be printed are shown.

Select the document to be deleted and check delete in the menu.

If the job you are deleting is the current job when you delete the job data that has already been transferred to the printer's memory will still be printed. If there is a problem with the printer (out of toner, offline, out of paper etc.) the job may take a long time to delete as it must wait for a time out.

8. Exploded Views and Parts List (Basic Model)

8-1. Main Assembly

8-2. Frame Assembly

8-3. MP Assembly

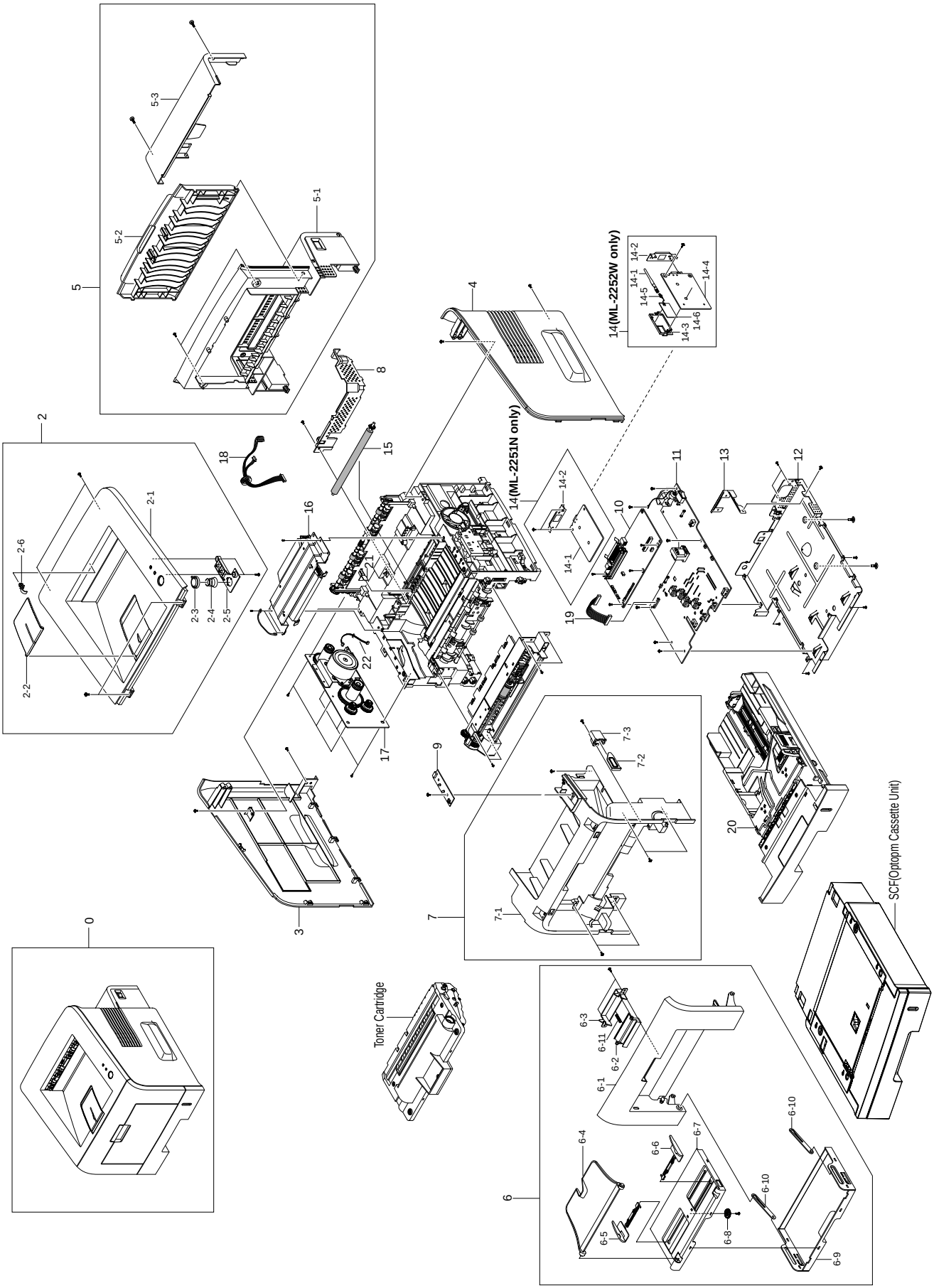
8-4. Fuser Unit Assembly

8-5. RX Driver Unit Assembly

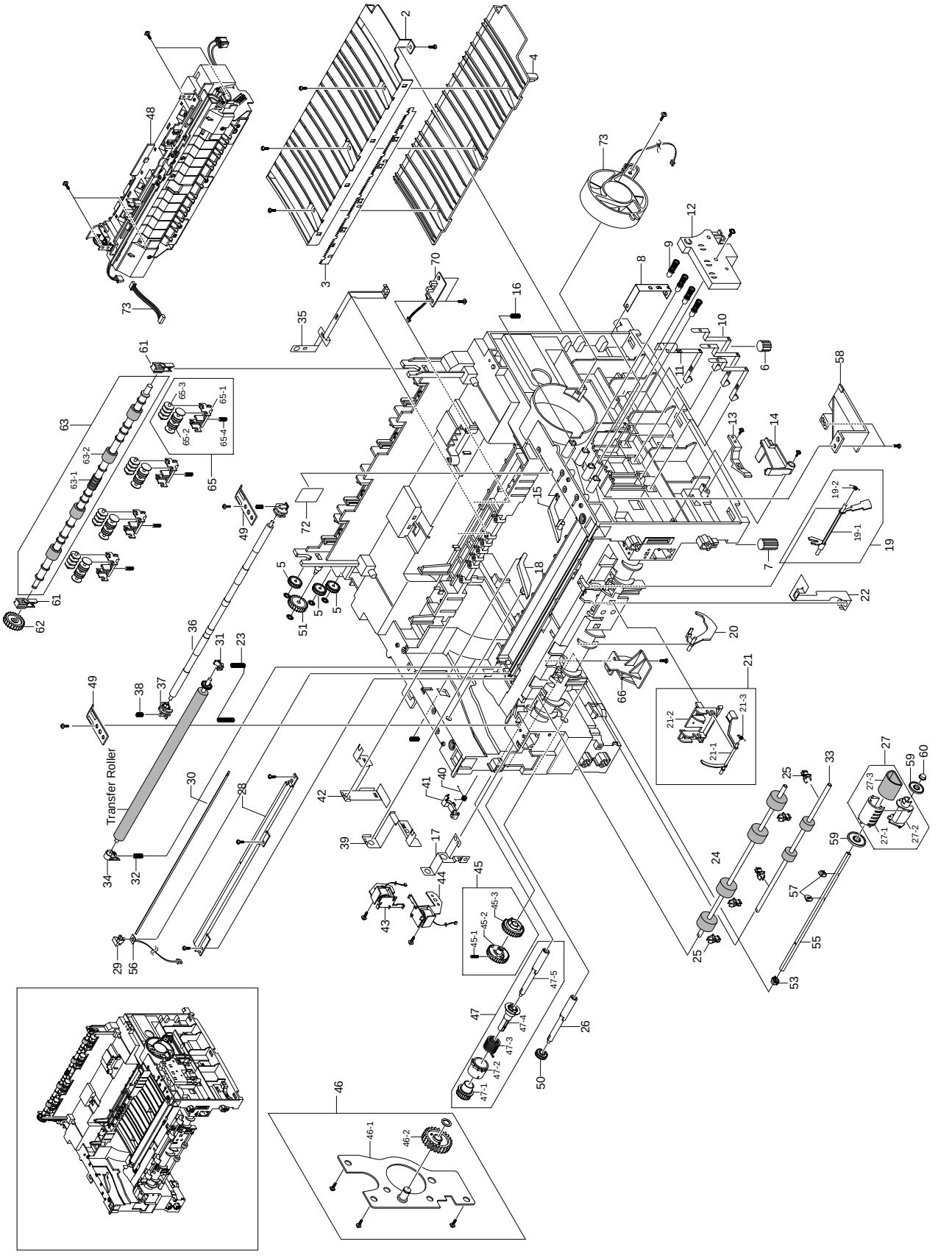
8-6. Cassette Unit Assembly

8-7. SCF(Option Cassette Unit) Assembly

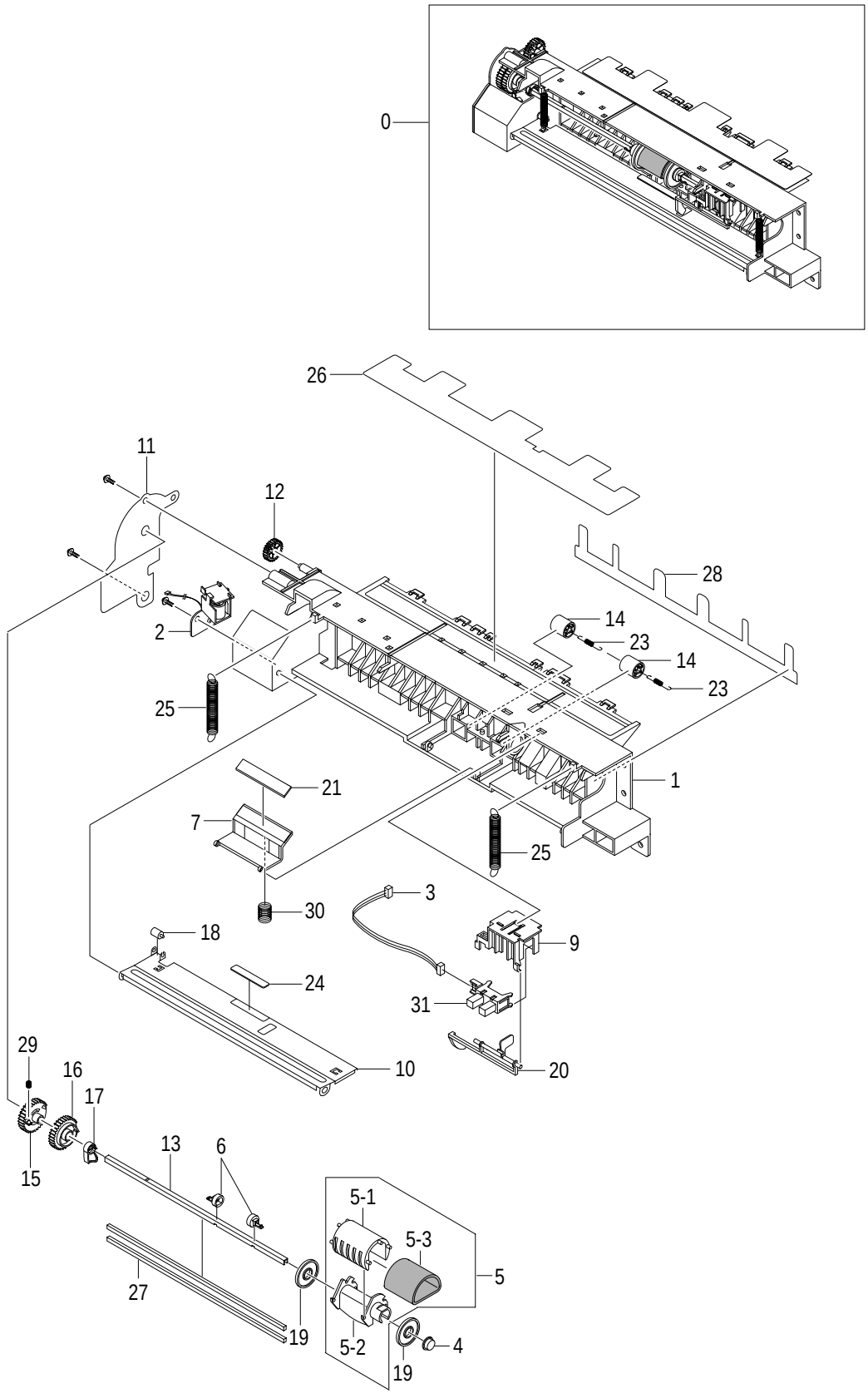
8.1 Main Assembly



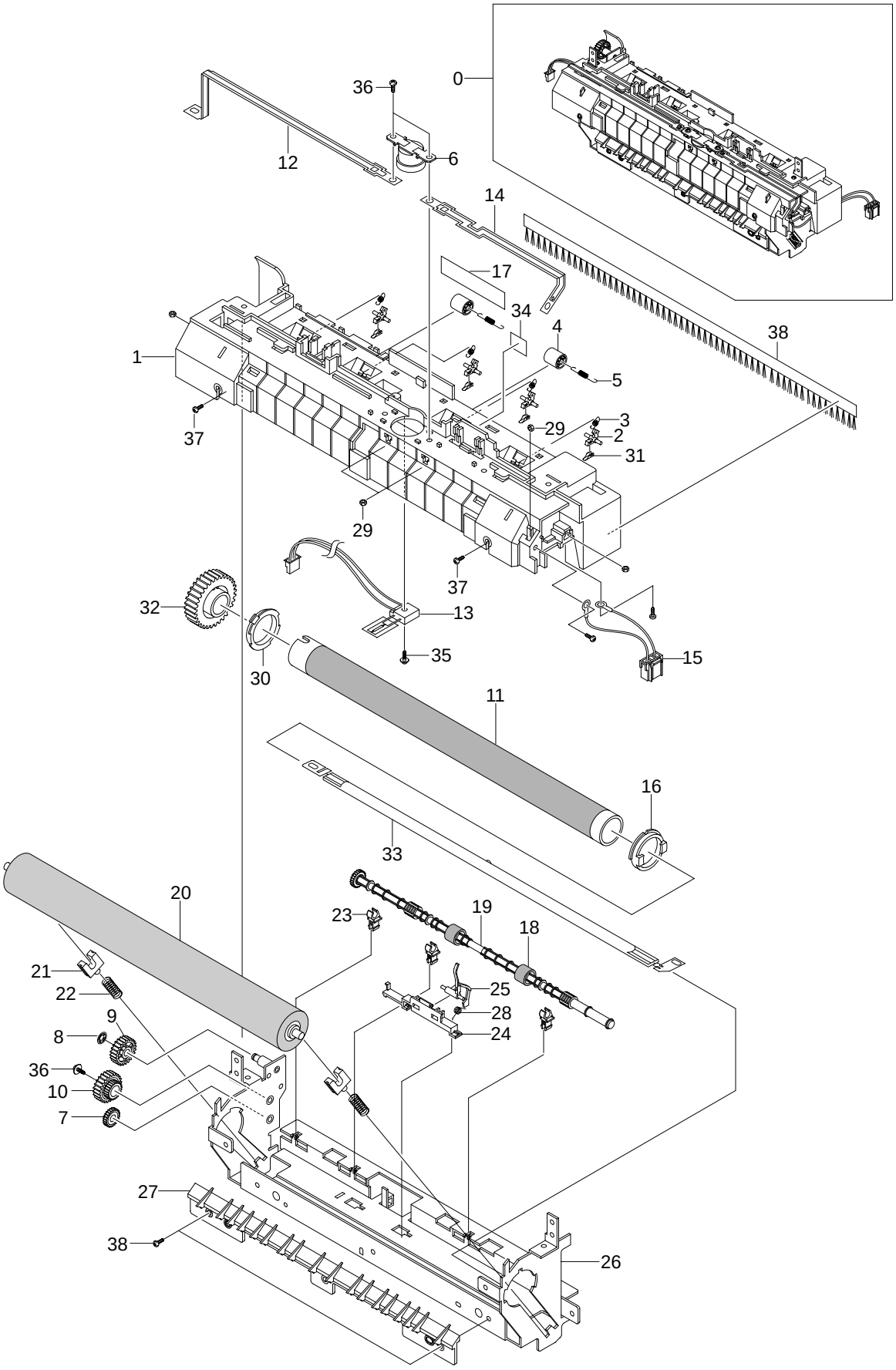
8.2 Frame Unit Assembly



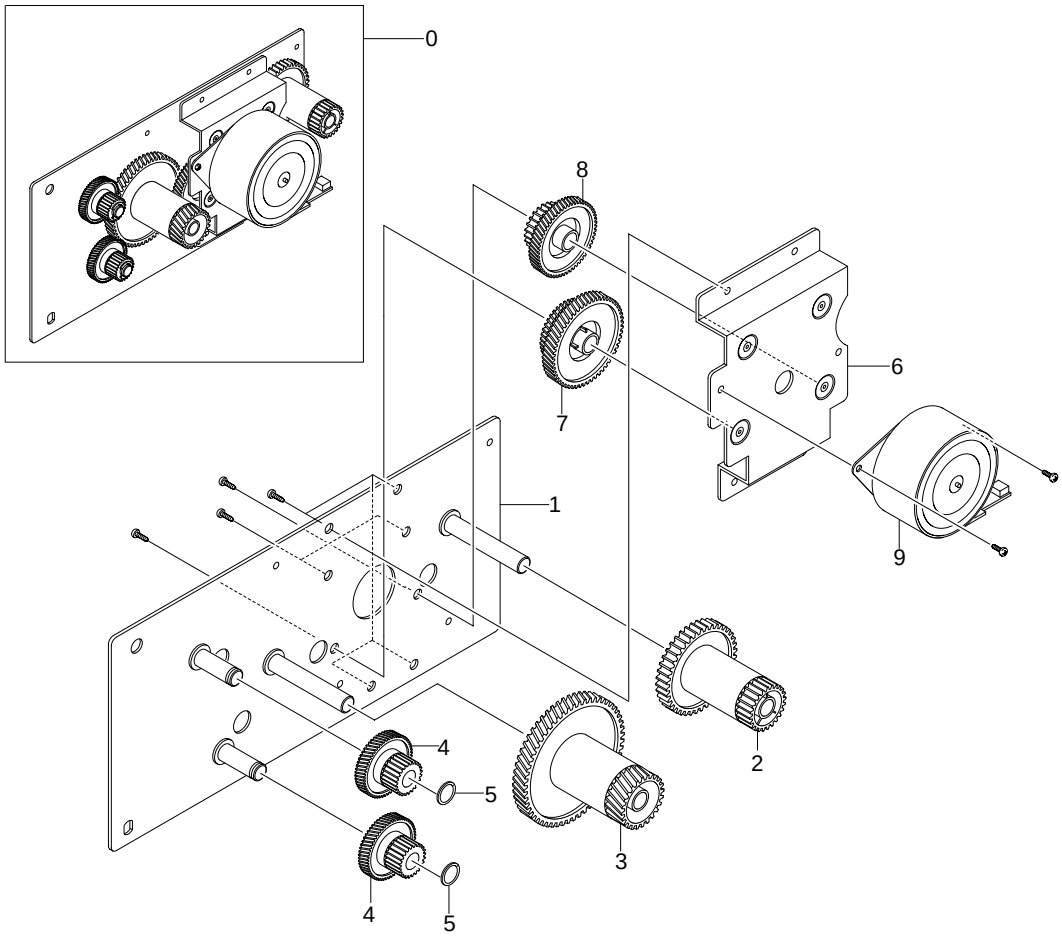
8.3 MP Assembly



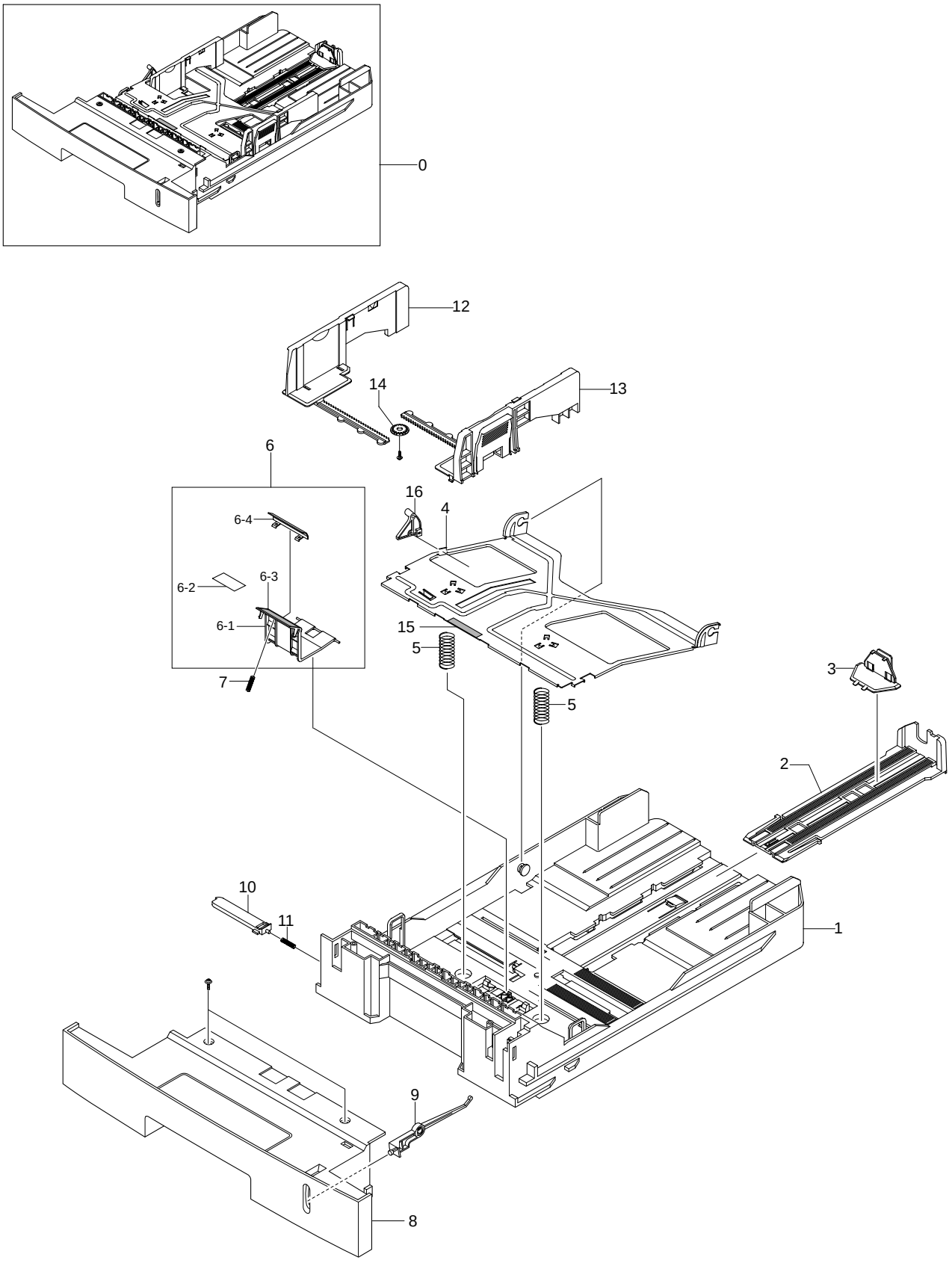
8.4 Fuser Unit Assembly



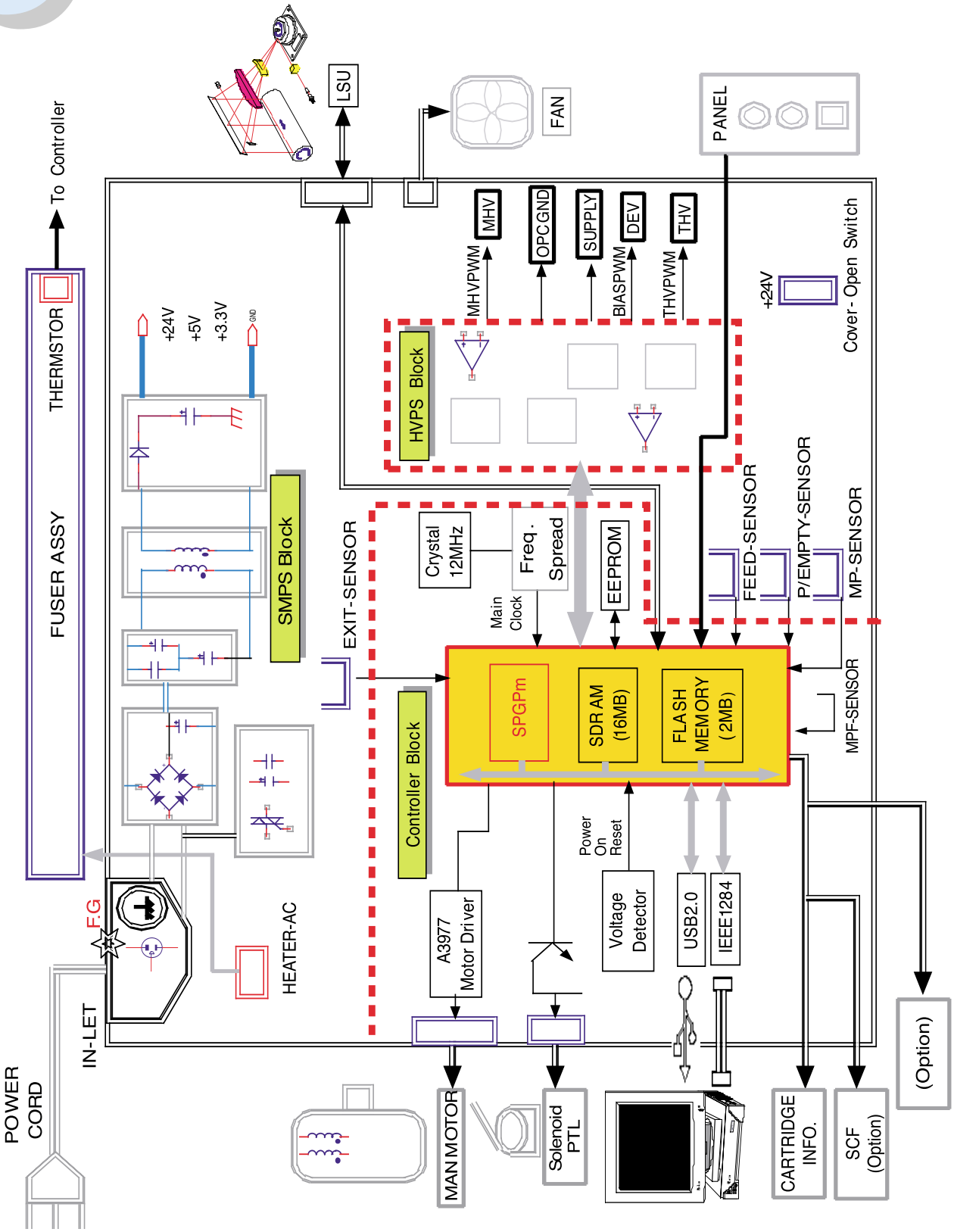
8.5 RX Driver Unit Assembly



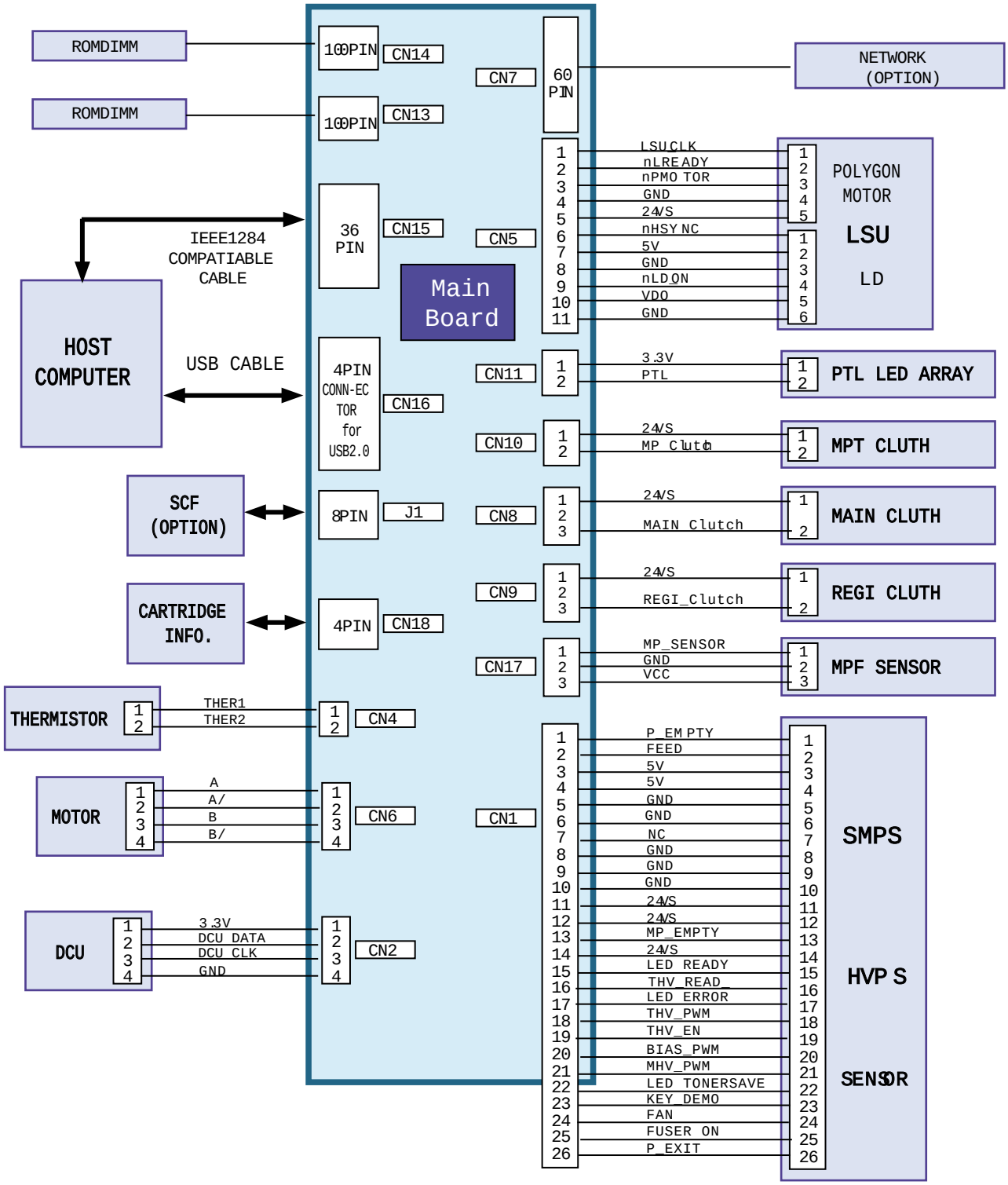
8.6 Cassette Unit Assembly



9. Block Diagram

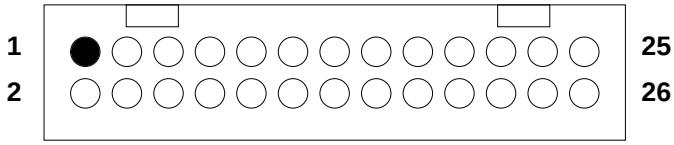


10. Connection Diagram



SMPS Signal PIN Table

Output Connector(to Main Board)				
Pin Name	No		No	Pin Name
Feed Sensor	1		2	Paper Empty
+5.0V	3		4	+5.0V
+5.0V GND	5		6	+5.0V GND
+24V GND	7		8	N.C
+24VS GND	9		10	+24VS GND
+24VS	11		12	+24VS
+24V	13		14	MANUAL
THV READ	15		16	LED READY
THV PWM	17		18	LED ERROR
BLAS PWM	19		20	THV EA
LED TONER SAVE	21		22	MHV PWM
FAN	23		24	KEY DEMO
EXIT	25		26	FUSER ON



HRW, 2.0mm, 2R,
26PIN, Straigh

Panel Pin Assign	
No	Pin Name
1	+5.0V GND
2	LED READY
3	LED ERROR
4	LED TONER SAVE
5	KEY DEMO

MP_CONNECTOR PIN	
No	Pin Name
1	Signal(P_REGI)
2	GND
3	VCC

EXIT_CONNECTOR PIN	
No	Pin Name
1	Signal(Exit)
2	GND
3	VCC

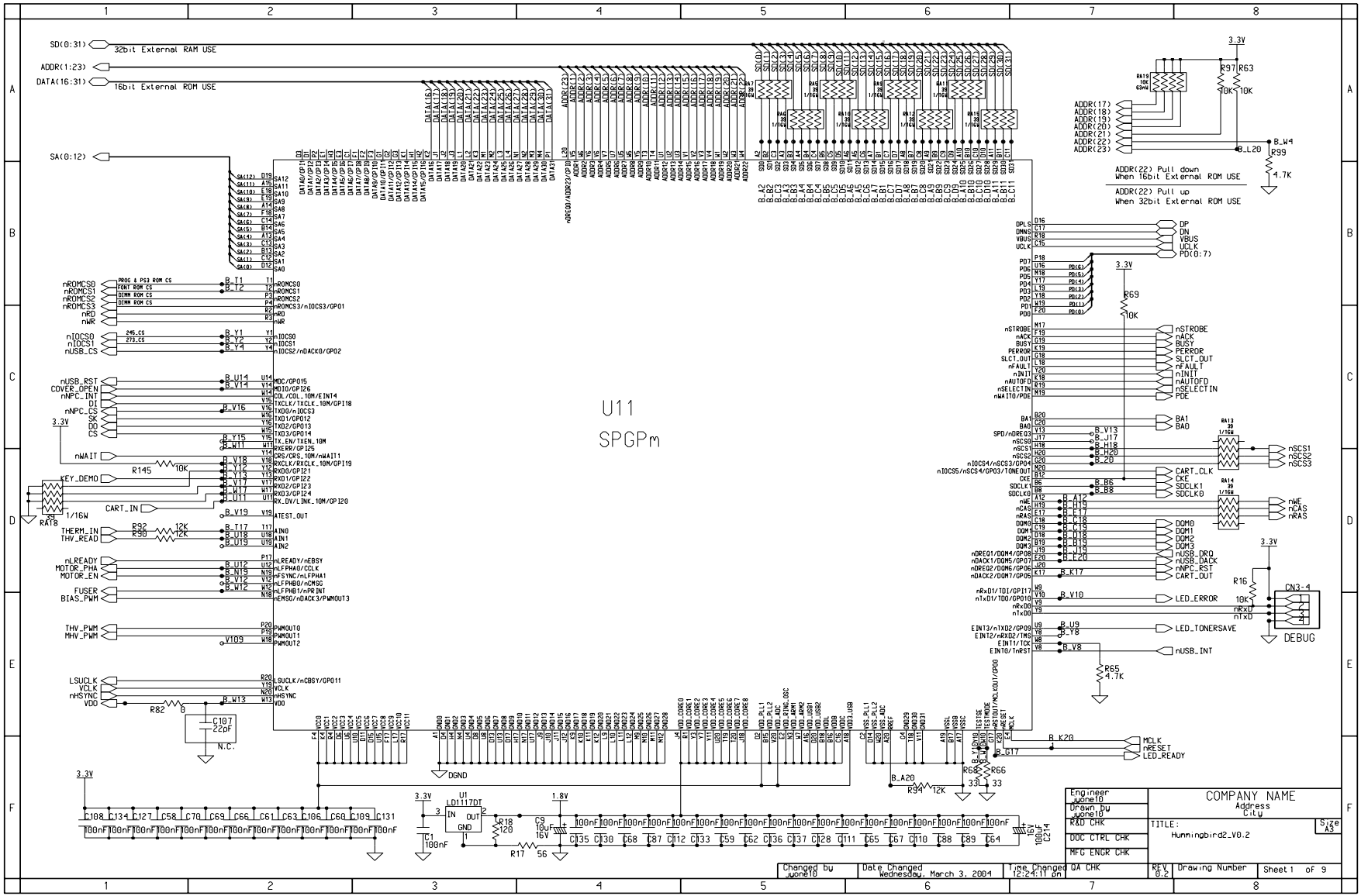
FAN_CONNECTOR PIN	
No	Pin Name
1	Signal(FAN)
2	NC
3	GND

MP_CONNECTOR PIN	
No	Pin Name
1	Signal(P_REGI)
2	GND
3	VCC

EXIT_CONNECTOR PIN	
No	Pin Name
1	Signal(Exit)
2	GND
3	VCC

11. Schematic Diagrams

11.1 Main Circuit Diagram (1/9)



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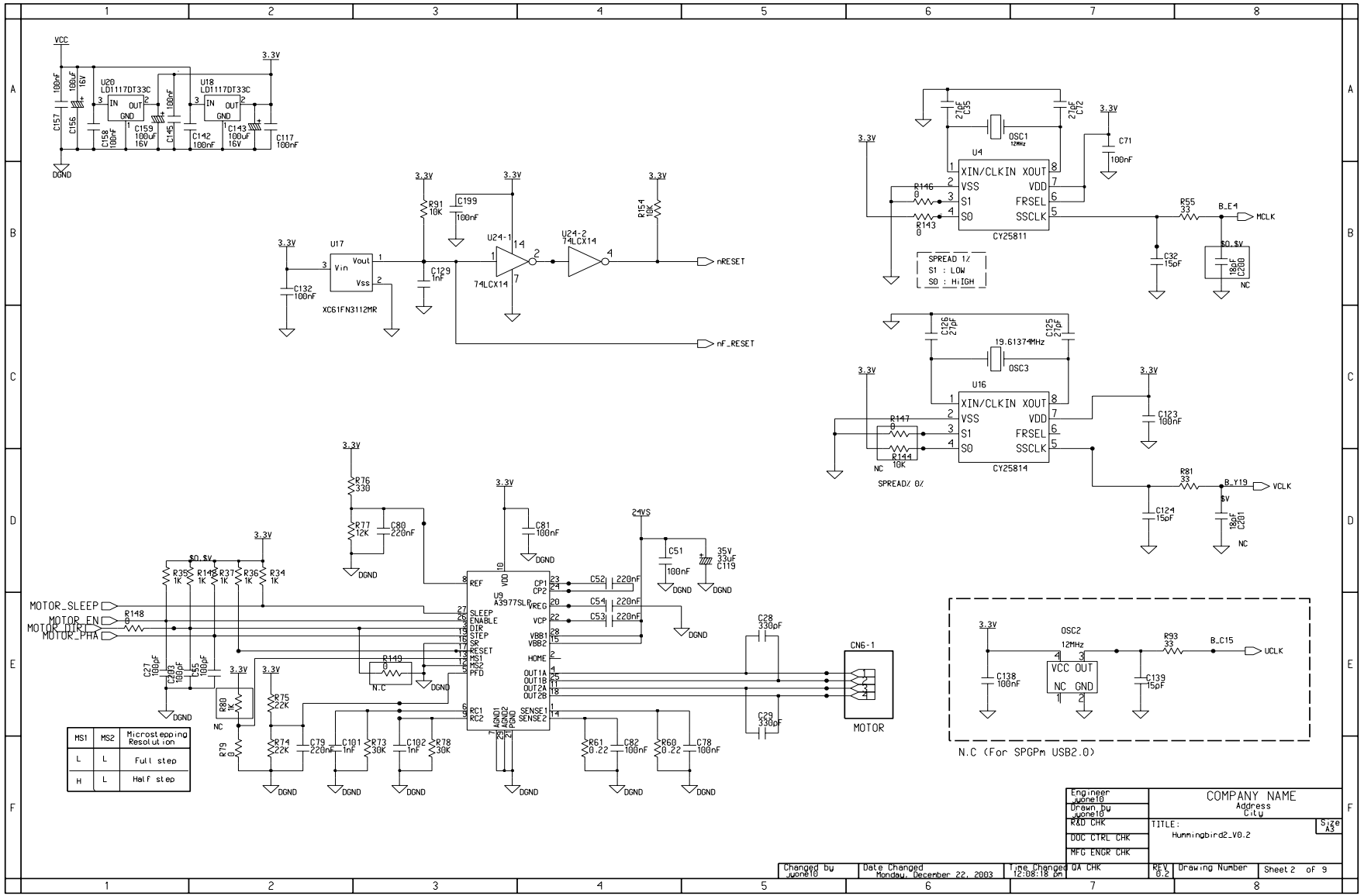
Main Circuit Diagram (2/9)



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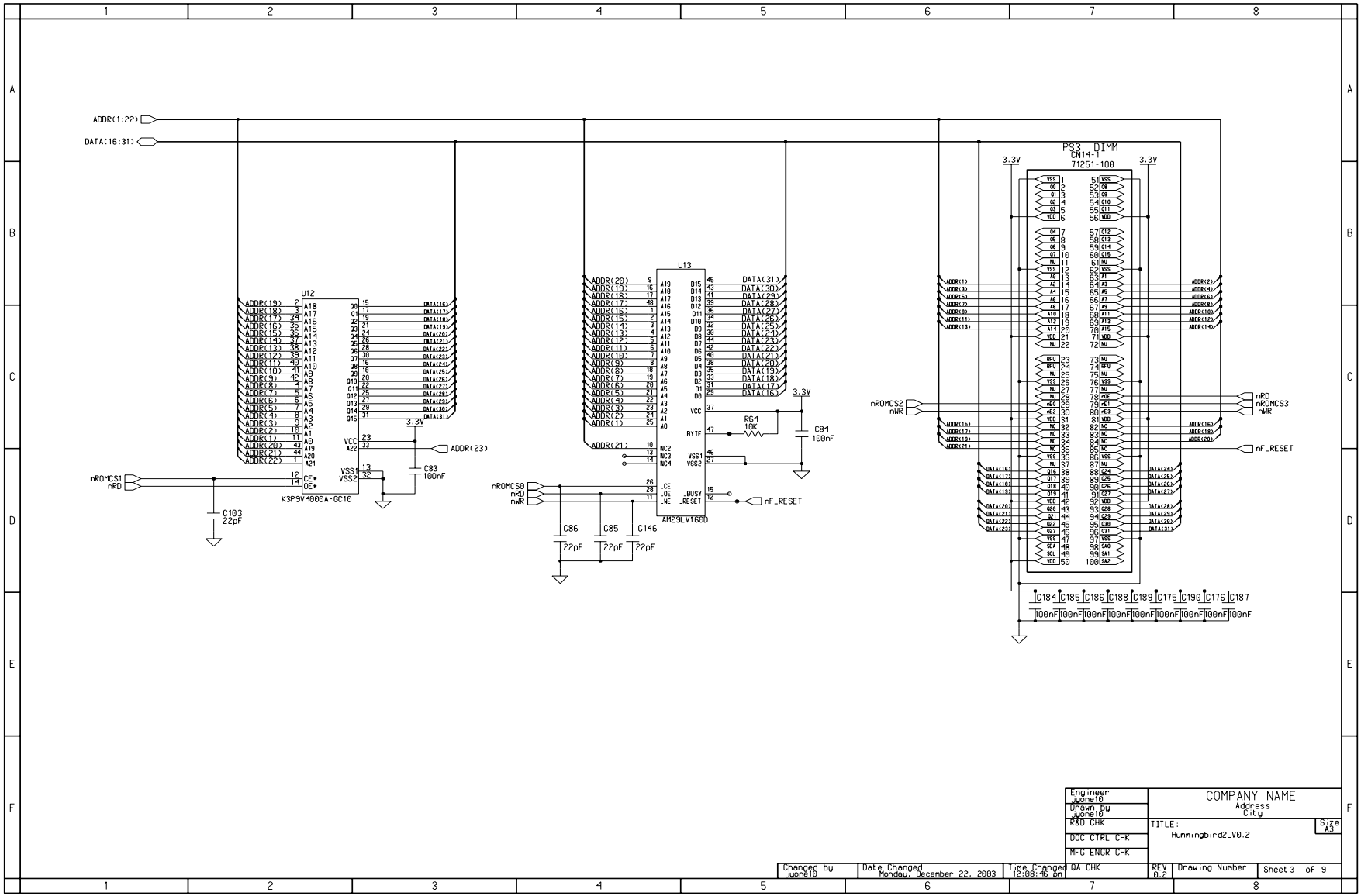
Main Circuit Diagram (3/9)



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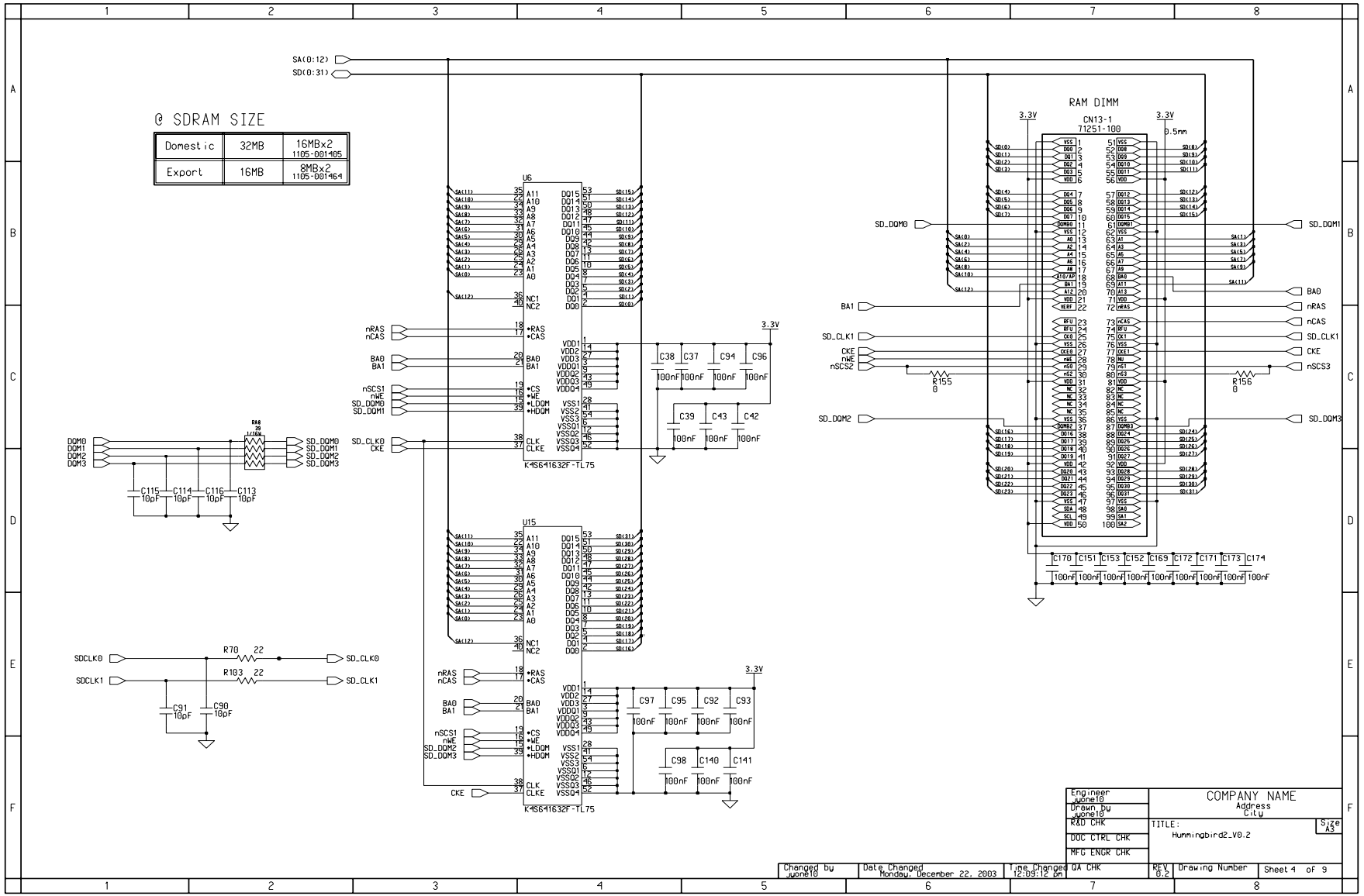
Main Circuit Diagram (4/9)



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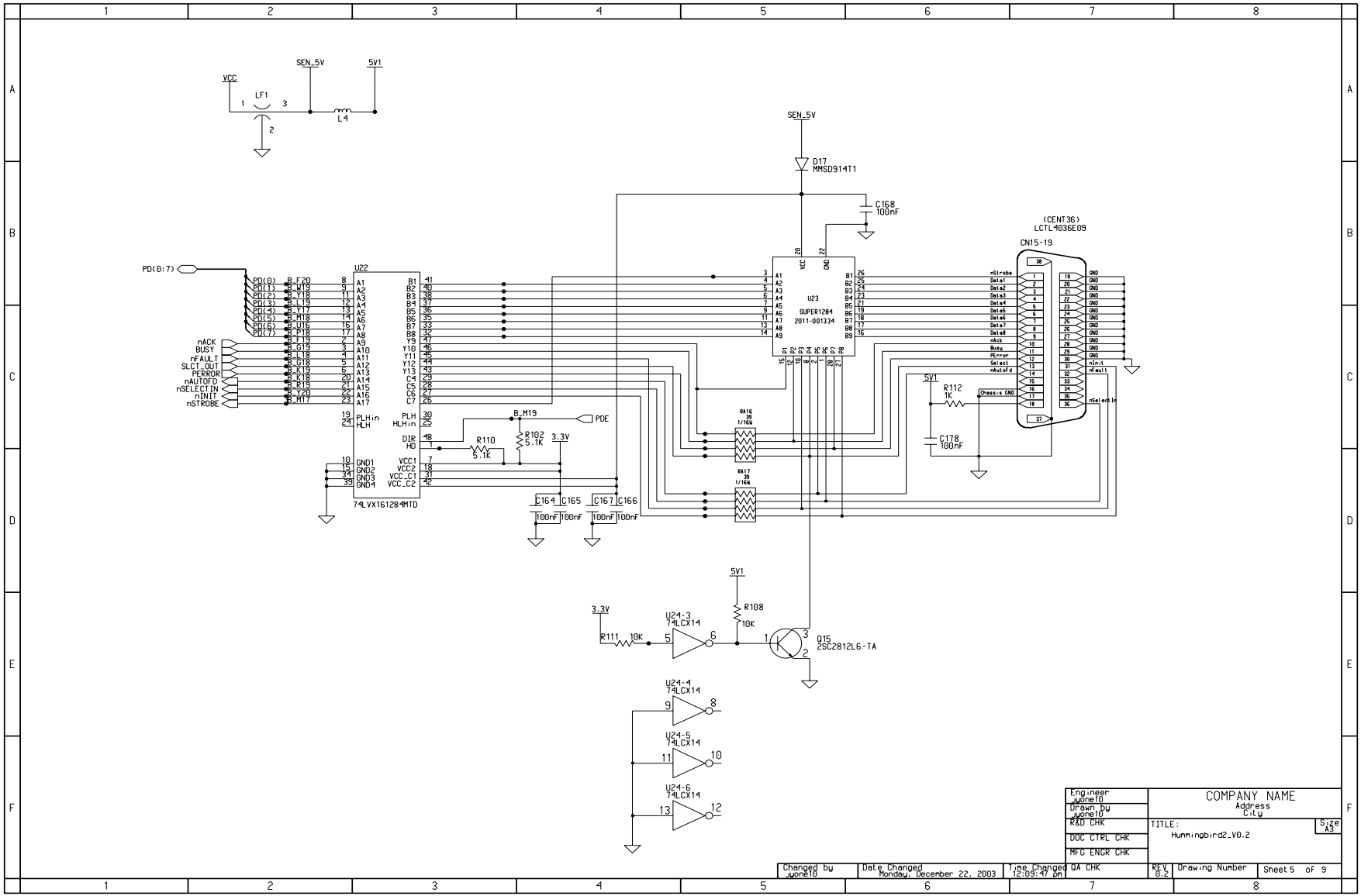
Main Circuit Diagram (5/9)



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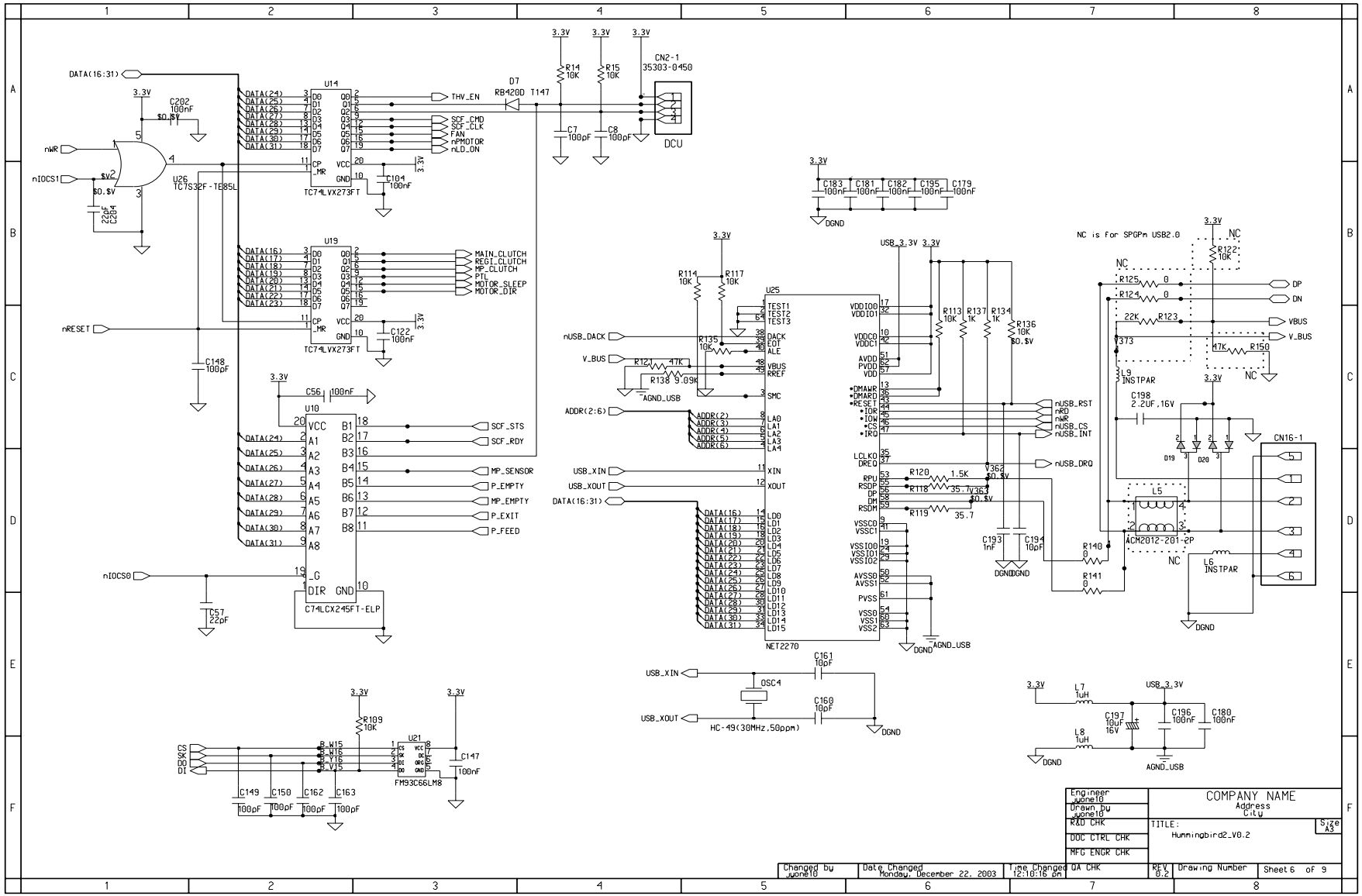
Main Circuit Diagram (6/9)



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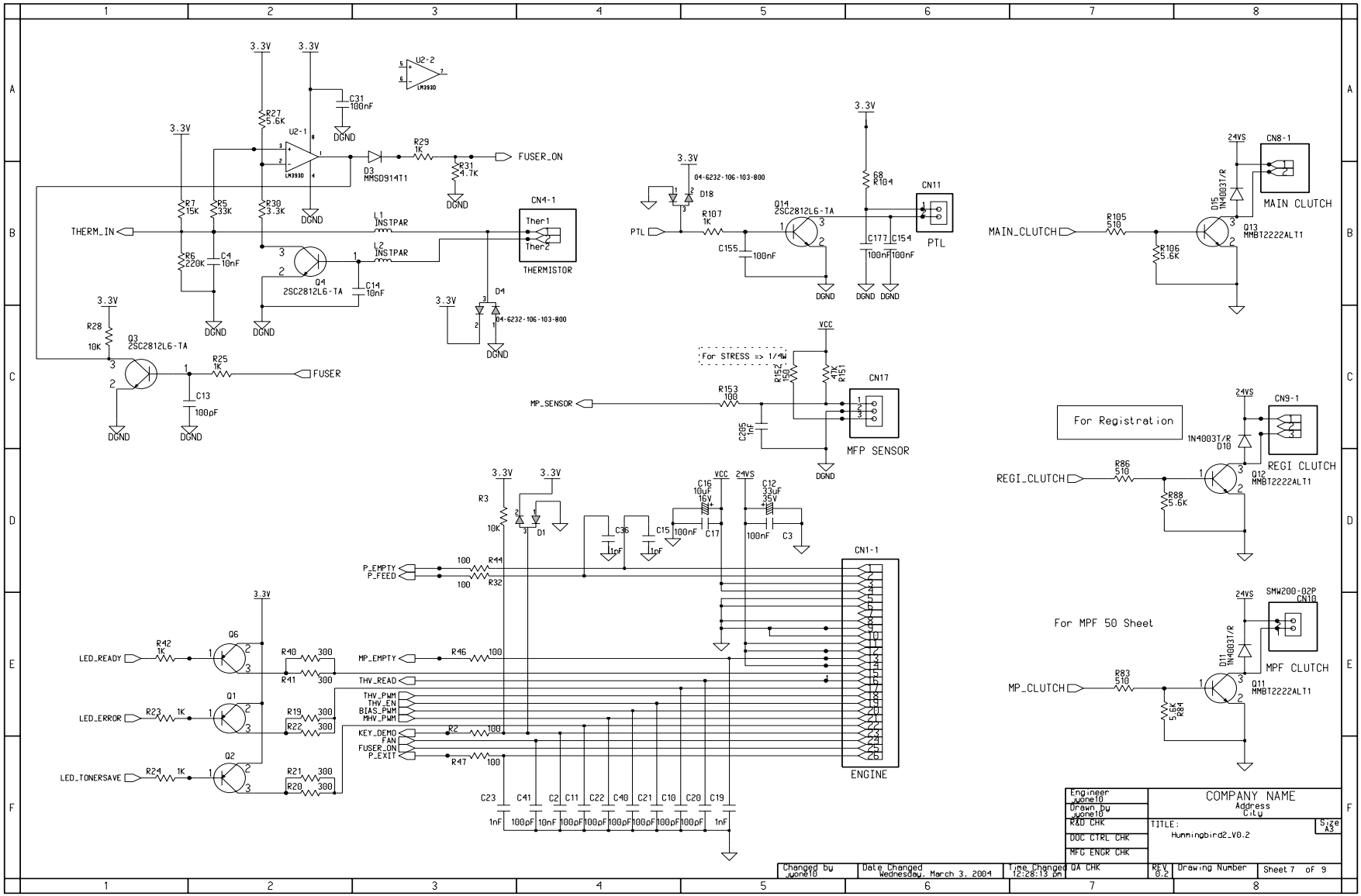
Main Circuit Diagram (7/9)



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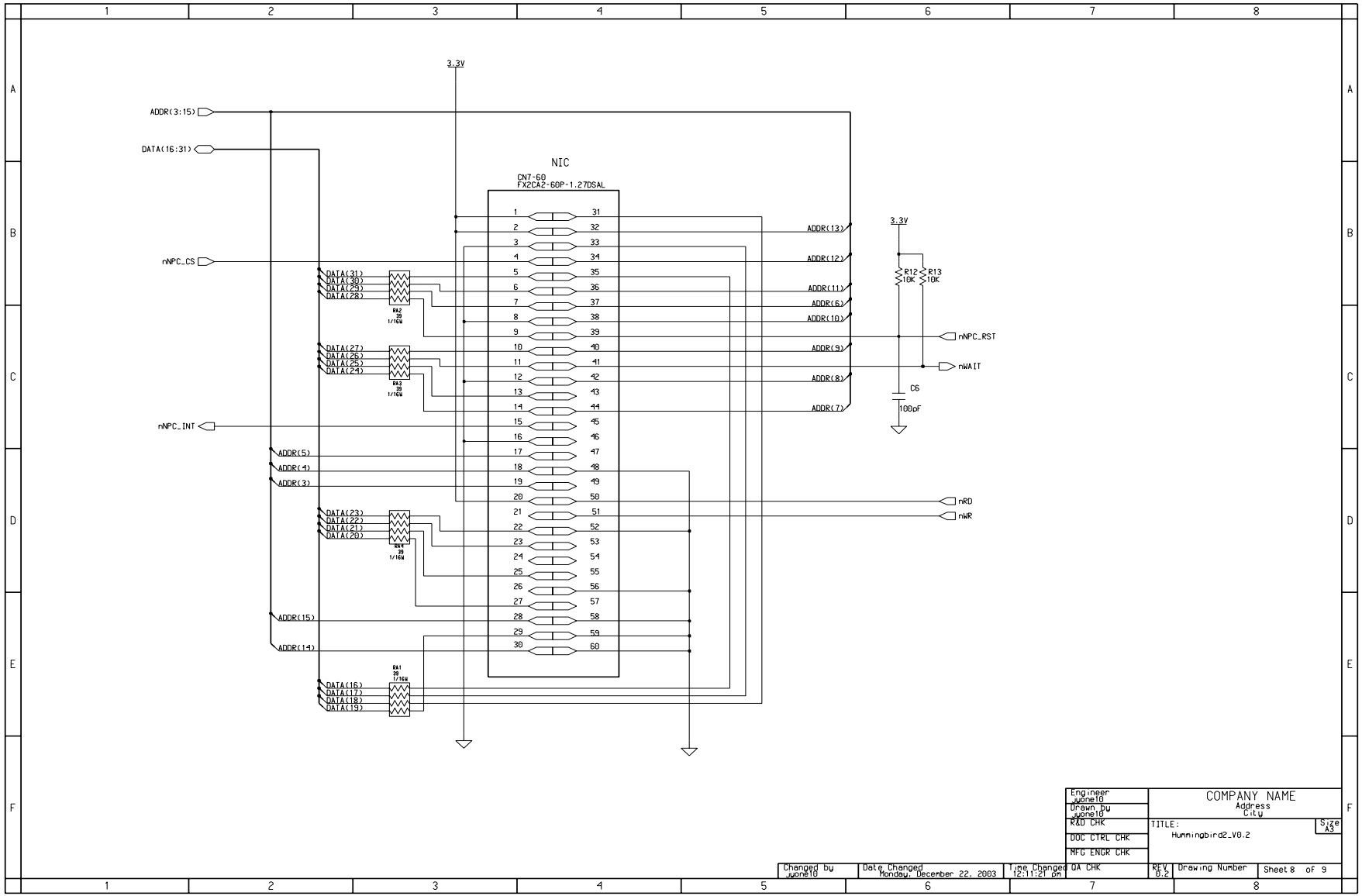
Main Circuit Diagram (8/9)



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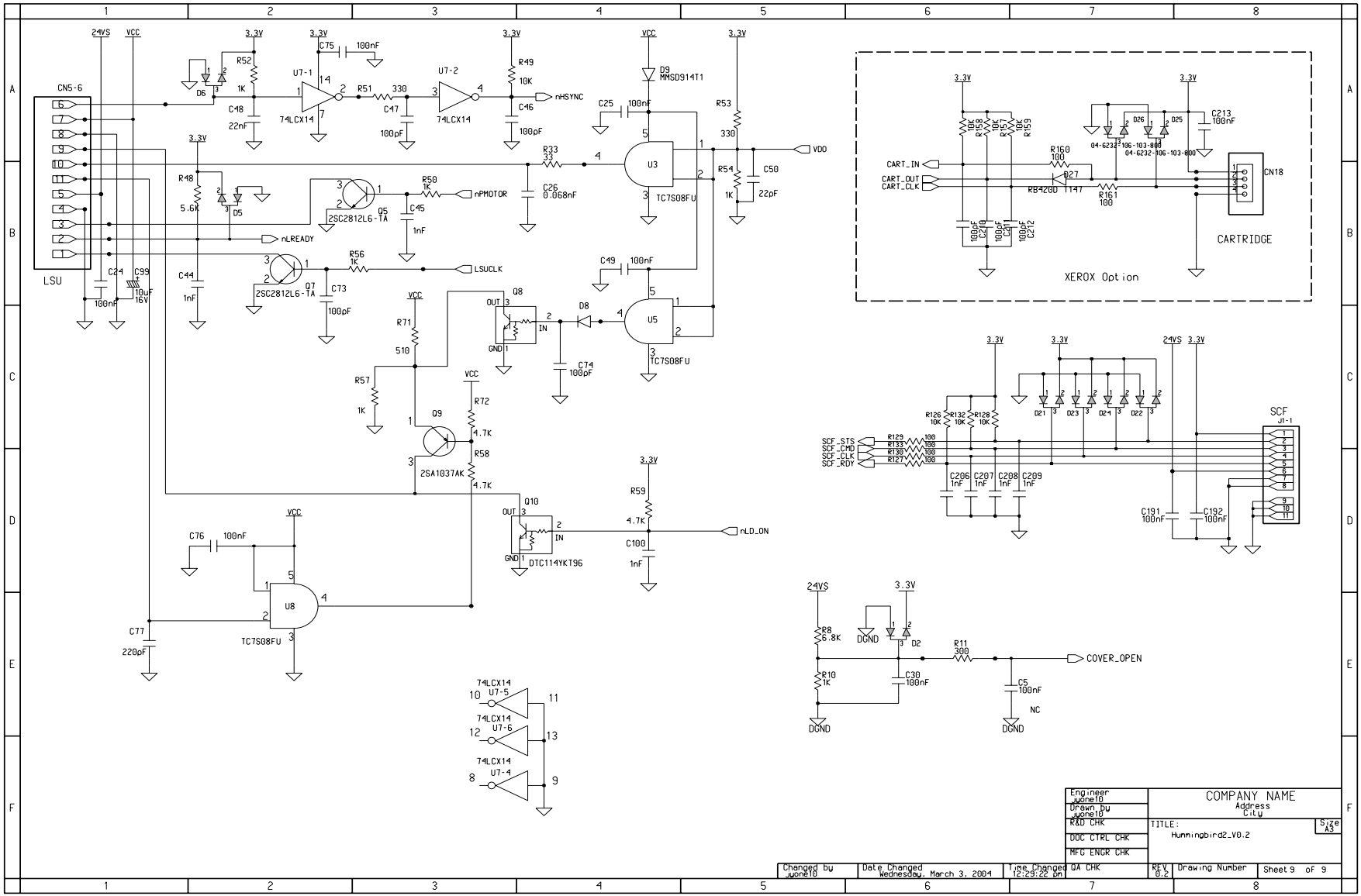
Main Circuit Diagram (9/9)



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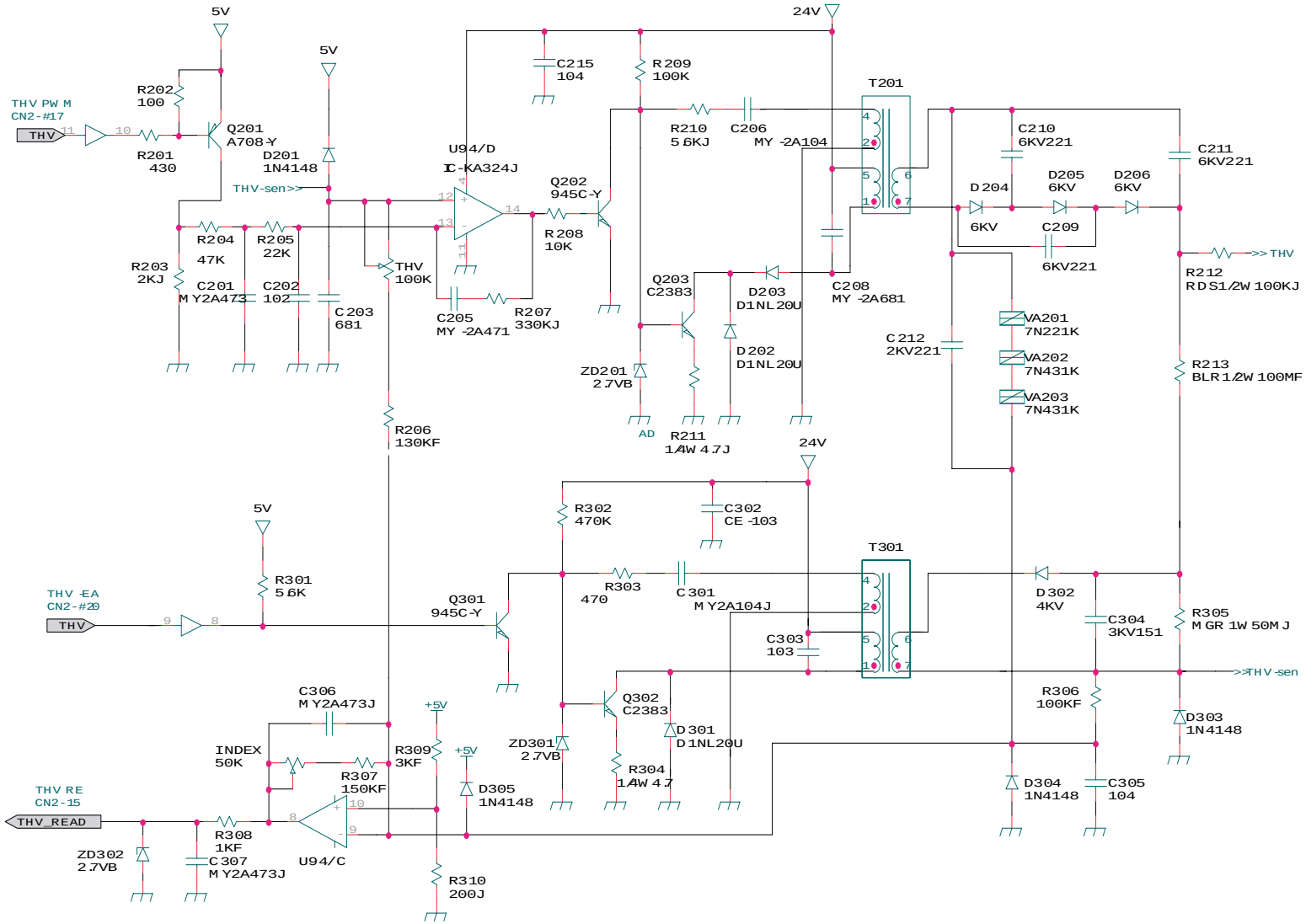
11.2 HVPS Circuit Diagram (1/2)



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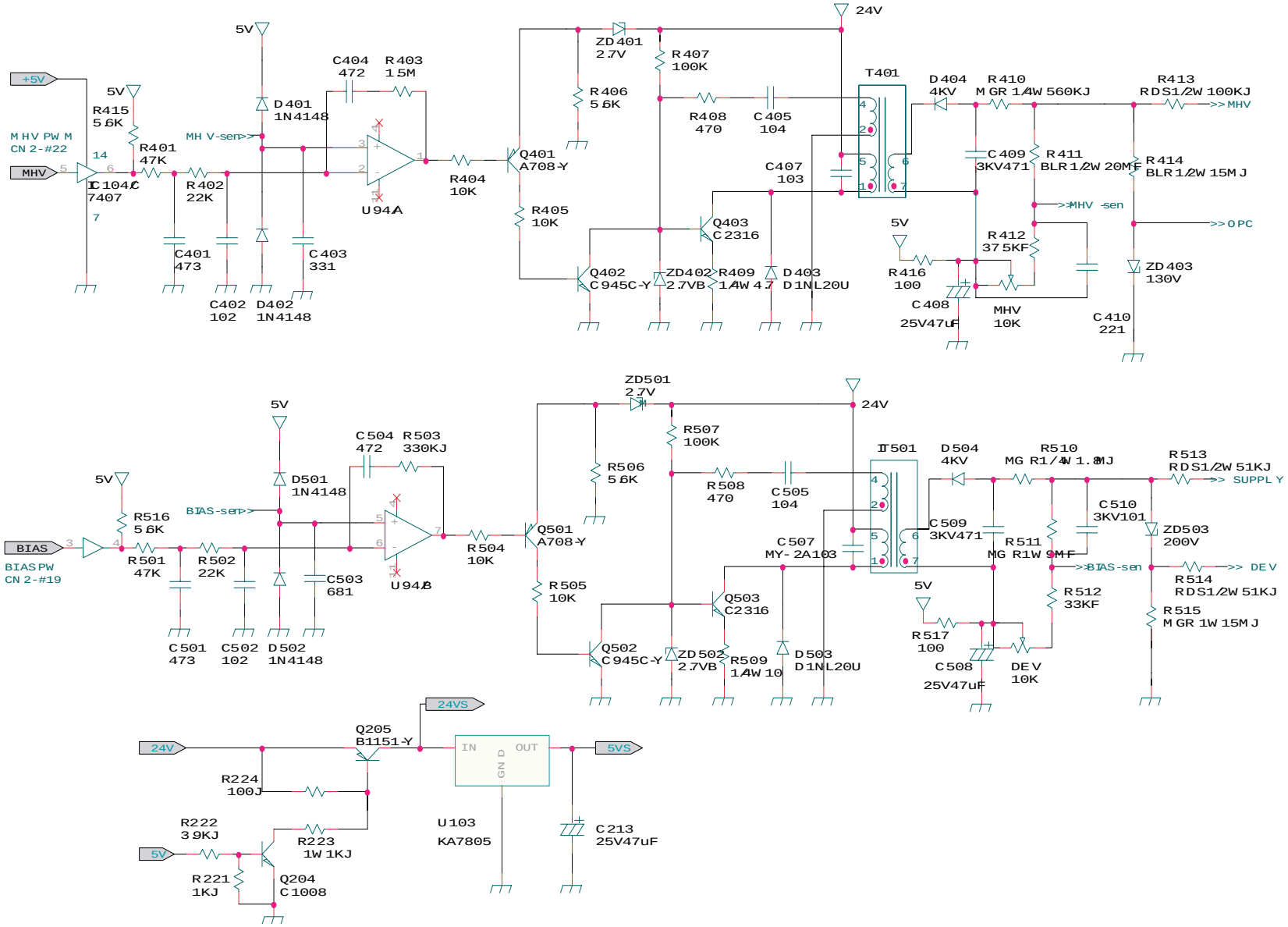
HVPS Circuit Diagram (2/2)



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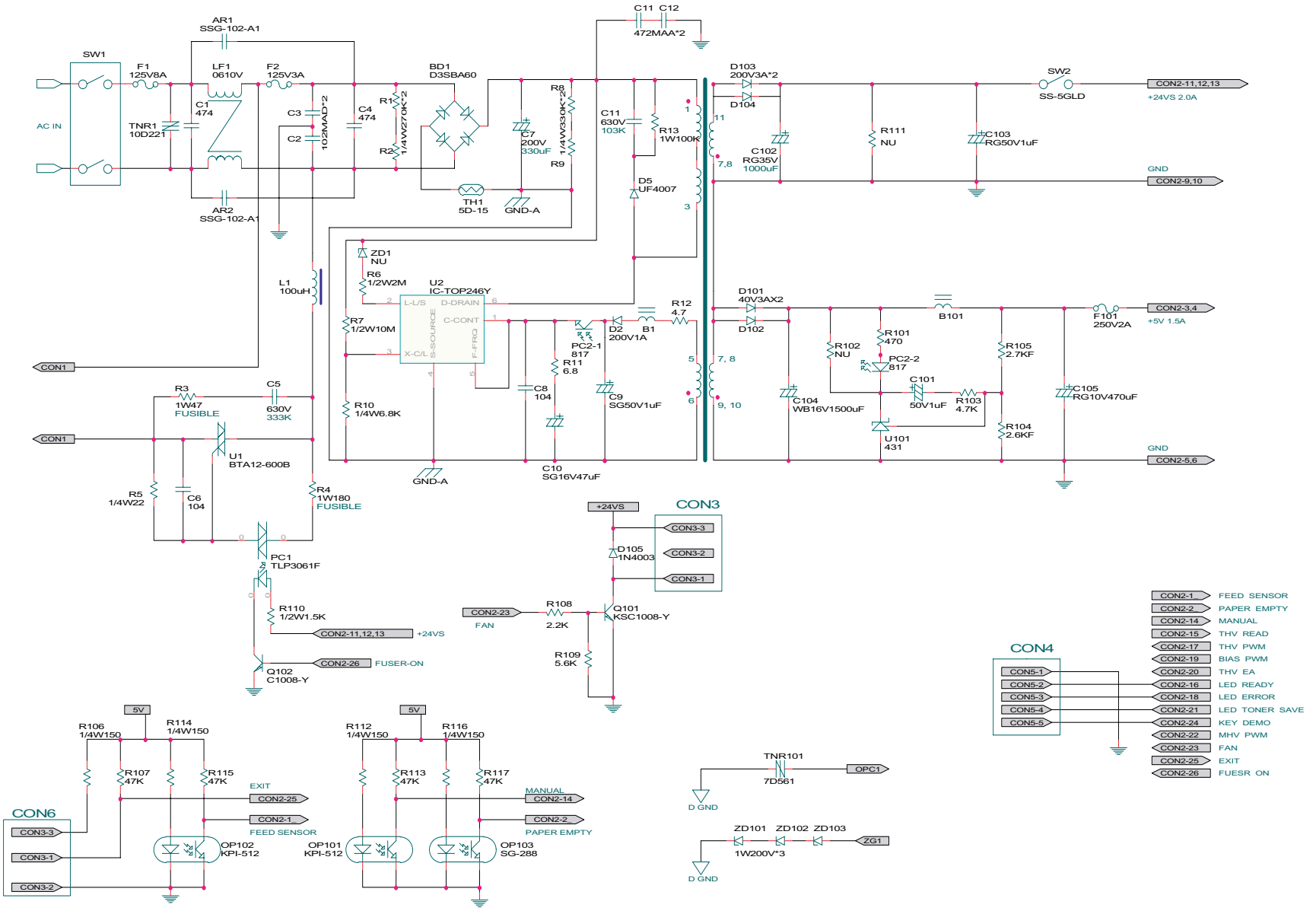
11.3 SMPS Circuit Diagram (1/3)



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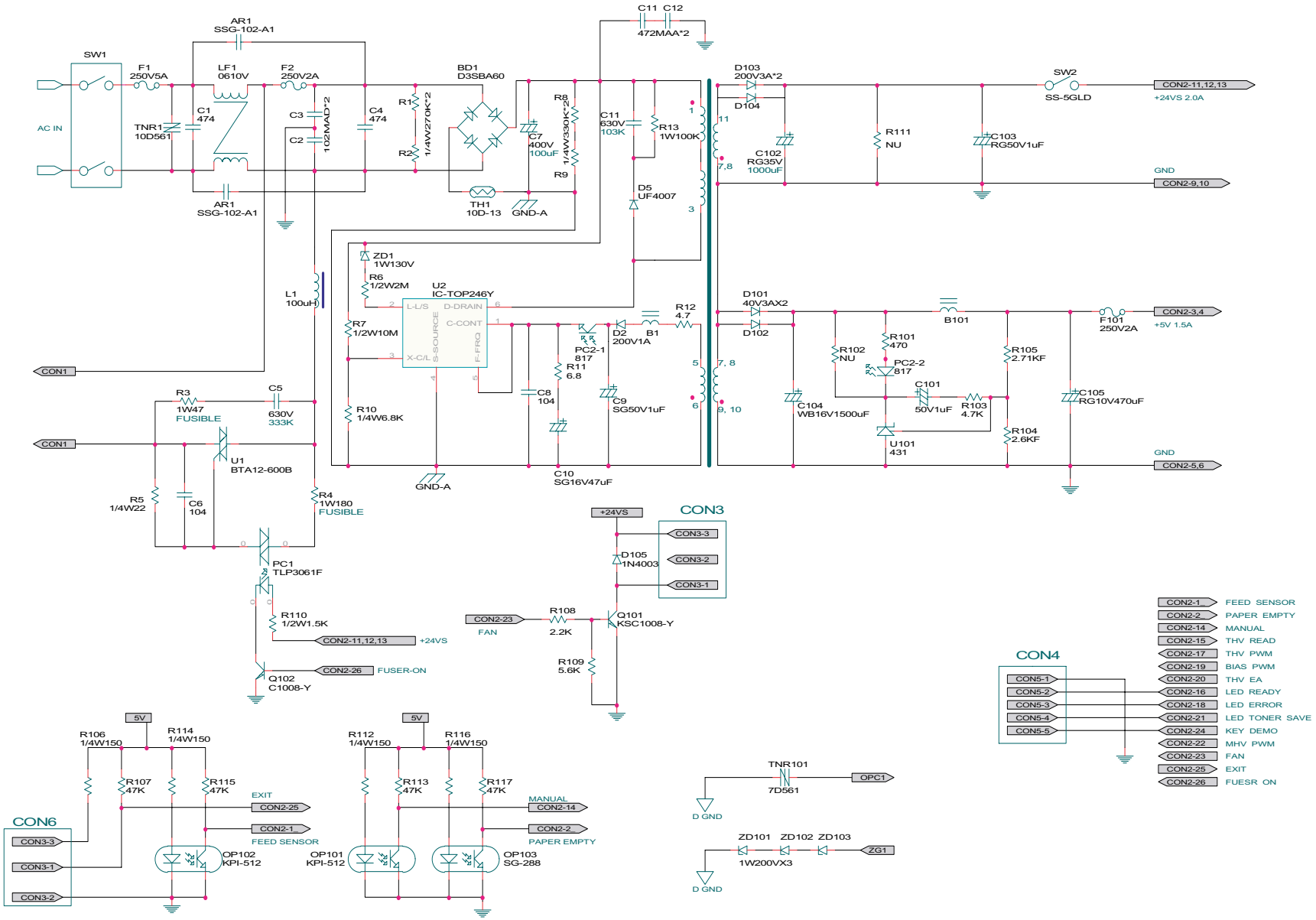
SMPS Circuit Diagram (2/3)



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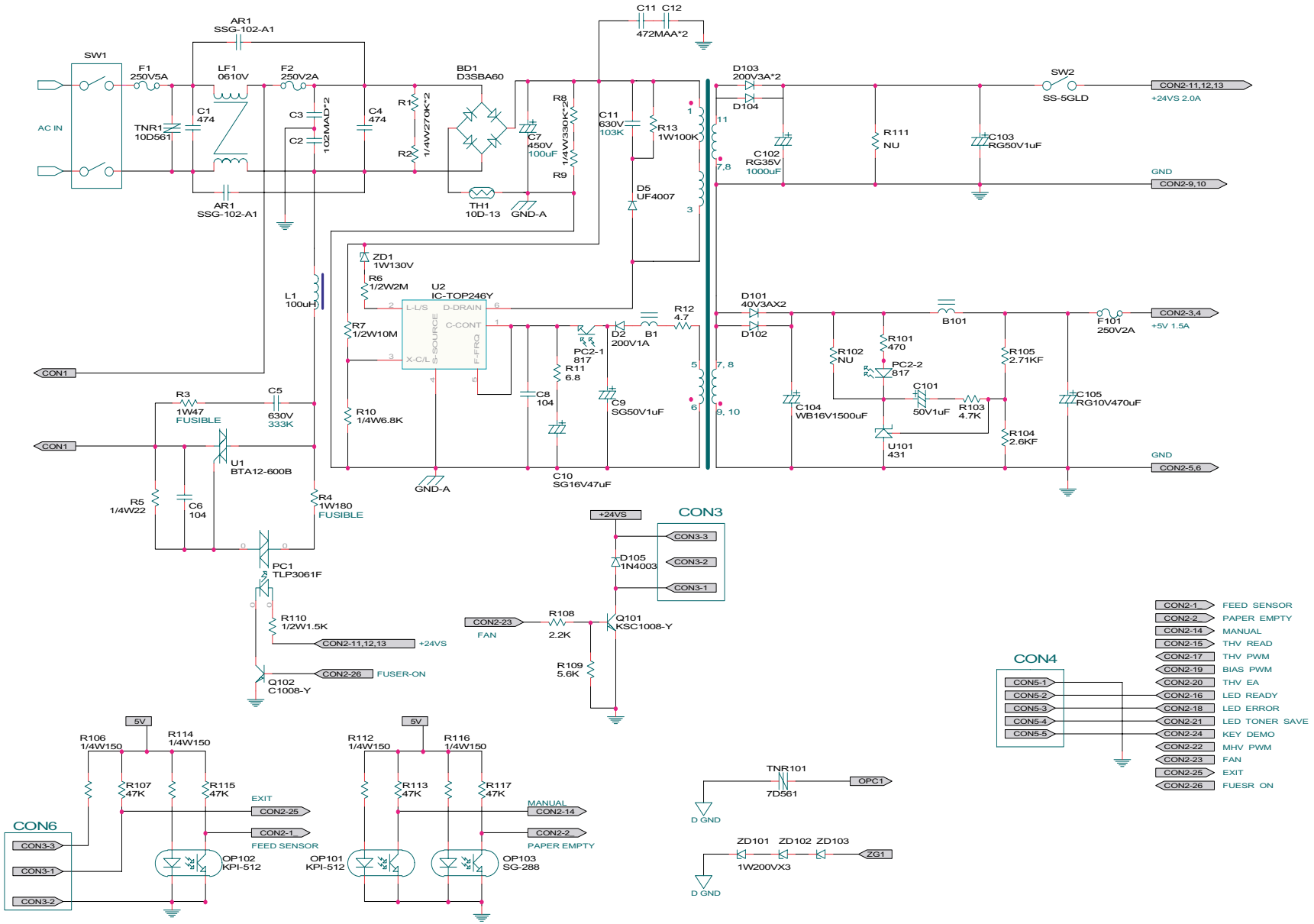
SMPS Circuit Diagram (3/3)



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